ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

MARCH 1955

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Teamwork On Taconite

The story of Erie Mining Co.'s commercial taconite project

1–Plant Offices
2–Electrical Shop
3–Material Storage
4–Assembly–Testing–Shipping
5–Machine Shop
6–Weld Shop
7–Stock Room
8–Tool Room
9–Boiler Plant & Research
10–Grinding Shop
11–Pattern Shop

A-S-H plant at Hamburg, Pa., in the "Pennsylvania Dutch" country, where Hydroseal and Centriseal Pumps are made by highly-skilled workers.

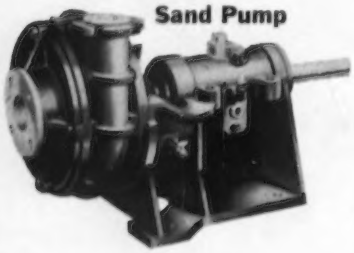
Background of better pumping

INTERCHANGEABLE

HYDROSEAL Slurry Pump
(Sealing water)

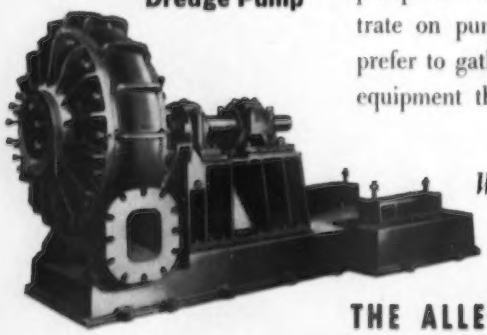
***CENTRISEAL* Slurry Pump**
(No Sealing water)

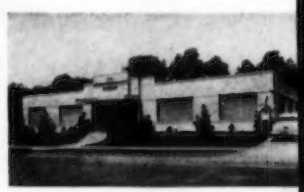
HYDROSEAL
Sand Pump



Looking from Assembly, Testing and Shipping section into the Machining area of Hamburg plant.

HYDROSEAL
Dredge Pump





Sales, Service & Engineering staffs plan installations and keep continuous performance records at Wynnewood, Pa.

Coordination of engineering and manufacture is a basic factor of the extraordinary effectiveness with which A-S-H pumps solve abrasives-pumping problems. When situations call for variations in design, new pumps are forthcoming with dispatch, for we concentrate on pumps – only pumps. As to accessories, we prefer to gather together the motor, drive and control equipment that is best for the particular installation.

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Representatives throughout the World

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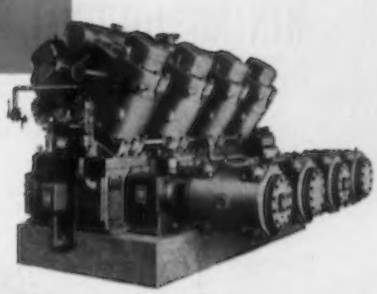
for

generating

AIR POWER

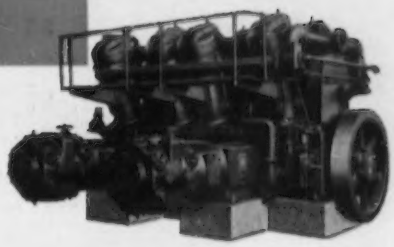
with OIL

type SVO
diesel
driven



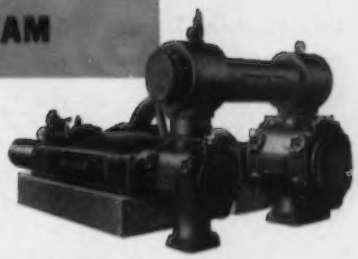
with GAS

type KVG
gas
driven



with STEAM

type XPV
steam
driven



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type XLE,
one of many types
electrically
driven

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(also available with
diesel engines)

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89th YEAR OF PUBLICATION

VOL. 156 No. 3

MARCH 1955

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LETTERS

Rounding the Tonnage

In the account of the new Mexican sulphur deposits (*E&MJ*, January 1955, p 72) I find the statement, "proved and probable reserves were estimated at 11,827,911 long tons."

I doubt if the final production figures when the deposits are exhausted will be accurate to within 1,000 tons. The reserve figure should surely have been rounded off to, say, eleven and three quarter millions. The article then goes on to say that additional holes more than doubled the original tonnage, so perhaps the nearest million tons would be more in keeping with the variables involved.

A. C. Skerl
Vancouver, B. C.

• *The figure was taken from* Pan American Sulphur Co. Annual Report 1953 *which said, "Contained in our SEC registration statement is a report of Mr. John C. Myers, independent geologist and petroleum engineer, which accorded estimated proven and probable sulphur reserves at 11,827,911 long tons."* E&MJ *used that figure. Ed.*

Payment Deferred

Just before World War II, I submitted a paper to *E&MJ* for publication, entitled Mining & Milling Procedure at Batong-Buhay Gold Mines, Inc., Lubogan, Kalinga, Mt. Prov., P. I. We shut down mine operations and entered the military service, were taken and held prisoners until the liberation of Manila. Consequently I lost all my personal papers and would appreciate very much getting some back copies.

Robert F. Brown
Fresno, California

• *We found on checking our records that your imprisonment during the Philippine occupation prevented us from sending you the usual payment accorded our authors. Your check, belatedly, is in the mail, with photostats of the article, with our compliments. Ed.*

"International Confidence"

Dear Mr. Wanders:

As a reader of *E&MJ Metal and Mineral Markets* since its inception, I congratulate you on guiding it through a quarter of a century to its present position of leadership in the industrial world.

. . . Your publication has lived up to its responsibility and has deservedly won international confidence. You have done a truly marvelous editorial job, and you and your associates deserve the warm gratitude of every member of the industry.

We at Wah Chang wish you and Metal and Mineral Markets another 25 years of distinguished service.

T. F. Moran
Executive Vice President
Wah Chang Corporation

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy Construction Aggregates Corp., Chicago, Ill.

A rubber gangplank for tomorrow's turnpike

A typical example of B. F. Goodrich improvement in rubber

THAT'S wet, sharp gravel being loaded on a ship. With millions of tons needed for new highways, gravel must be handled at low cost. A conveyor belt to shipside was the fastest and cheapest way.

But the wearing avalanche of 2800 tons an hour dumped on the belt cut and tore the rubber cover, broke the fabric reinforcement. Then engineers suggested a B. F. Goodrich *cord* belt. It is built with cords, running lengthwise, held in place by rubber. When heavy loads hit this belt it "gives"—absorbs the shock instead of fighting it. The rubber in the belt is so tough it can stand the cuts and gouges of millions of sharp edges. When this picture was taken, the B. F. Goodrich cord belt had carried more than 14 million tons, had lasted longer than any belt ever used by the company, and still looked good for years more.

Product improvement like this is *always* going on at B. F. Goodrich. New ways are constantly being found to make conveyor belts, V belts, hose, all sorts of products work better, last longer. No product is ever regarded as "finished" or standardized.

How this cuts your costs: Because of these improvements and because B. F. Goodrich is one company that will *never* lower its quality standards, you can be sure of top performance and real money savings when you specify B. F. Goodrich. To find out about the latest improvements in the rubber products your company uses, call your B. F. Goodrich distributor or write *The B. F. Goodrich Co., Dept. M-375, Akron 18, Ohio.*

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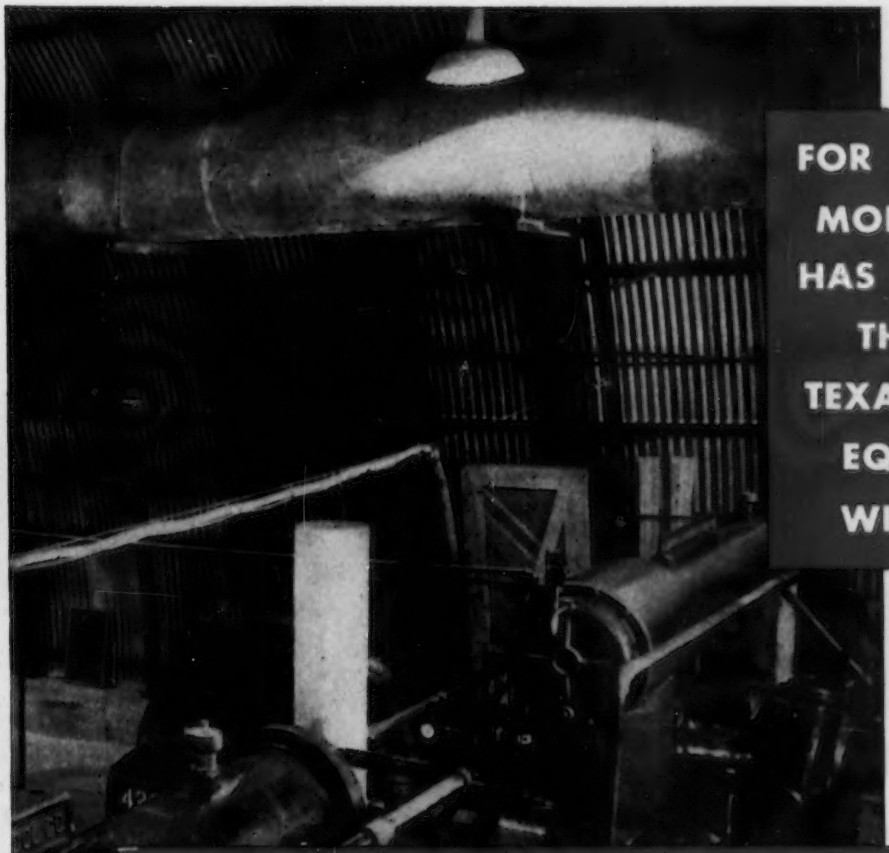

FOR OVER 20 YEARS, MORE COPPER ORE HAS BEEN MINED IN THE U.S. WITH TEXACO-LUBRICATED EQUIPMENT THAN WITH ANY OTHER.

LUBRICATE YOUR AIR COMPRESSORS with the oil that will keep them clean and rust-free—*Texaco Regal Oil R&O*. This premium-quality oil keeps costs low because it keeps valves clean for proper functioning, keeps lines clear and piston rings free, and prevents rust and harmful deposits in the system.

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Get in touch with a Texaco Lubrication Engineer and let him help you cut maintenance costs on all your equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N.Y.

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FOR THE MINING INDUSTRY

LESS TIME OUT FOR MAINTENANCE...

Overhead reduced to a minimum

WITH TRAYLOR HB JAW CRUSHERS

In scores of installations, Traylor HB Jaw Crushers have proven their ability to cut maintenance costs . . . reduce power requirements and boost production output. Traylor's original curved jaw plates, applying power as a direct crushing force, are mainly responsible for this amazing record. They outlast ordinary plates 3 to 1. Traylor curved jaw plates distribute wear evenly so they retain their original curved shapes indefinitely.

Traylor HB Jaw Crushers are made in a wide range of sizes with feed openings from 36″ x 42″ to 56″ x 72″. Capacities range from 120 to 540 tons per hour. Get the facts . . . find out how Traylor HB Jaw Crushers produce greater capacities using less power per ton produced. For the full story send for illustrated bulletin 5105.

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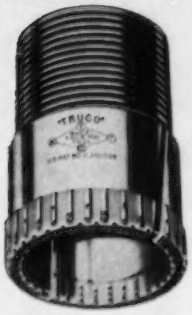
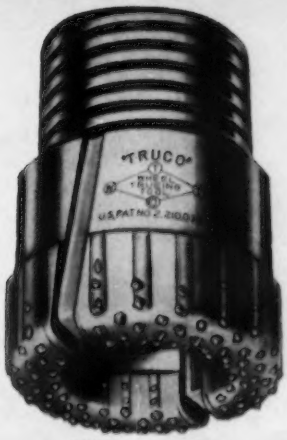
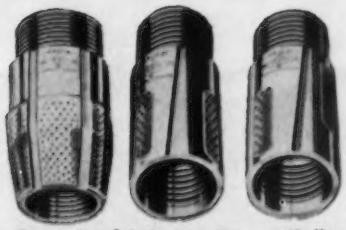


TRUCO Casing Bit



TRUCO Coring Bit

Impregnated Casing Shoe



Tapered and Strip-type Reamer Shells

All Joy-Truco and Truco bits are engineered for exceptional performance. They combine these outstanding features:

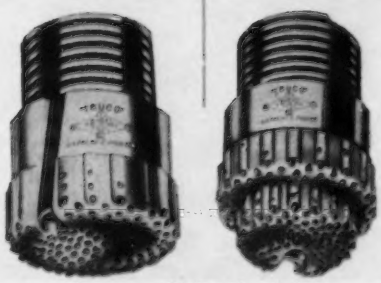
1 *Highest quality materials—the best drilling diamonds.*

2 *Patented matrix renowned for its holding qualities and resistance to abrasion.*

3 *Free-cutting design which results from precise placing of diamonds and waterways.*

These advantages are the result of constant research and experience, acquired through working in the field with mining engineers and drill operators. And Joy research goes on . . . each used bit returned for our fast, expert resetting service, is thoroughly examined to determine critical points of wear and other performance data. Each reset bit sent back to the same job, or for use on similar formations, contains corrective features which have been shown as necessary by our examination.

Why not find out about "the right bit for every formation?" Our sales and resetting service is worldwide, and a Joy diamond drill specialist is quickly available on request to check your drilling problems and recommend the bit that will do the best job for you.
Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



Concave and Pilot Blast-hole Bits

Consult a Joy Engineer

JOY

W&D M4830

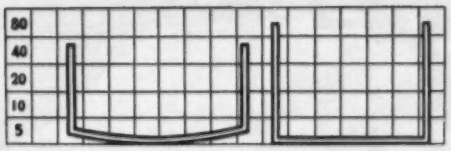
SINCE 1851—OVER A HUNDRED YEARS OF ENGINEERING LEADERSHIP

5 BIG REASONS WHY ALLIS-CHALMERS move more dirt at

Watch an Allis-Chalmers scraper at work and you'll see that it loads bigger — travels and maneuvers more easily — puts more dirt right where you want it with the least tractor effort. Check features and you'll understand *why* an Allis-Chalmers scraper is able to outperform others. Then compare prices and you'll see that it gives you more scraper capacity per dollar — more for your money in every way.

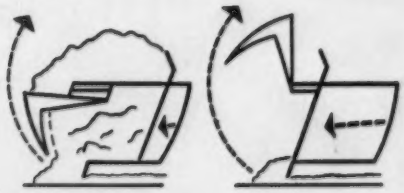
INTRODUCING THE AC-108, newest scraper in the Allis-Chalmers line — shown here with an Allis-Chalmers HD-15 Tractor Has 8.4 struck capacity (11 yd heaped). Incorporates all of the big-yardage features that have been job-proved in the other Allis-Chalmers scrapers, 2 to 18 yds heaped capacities.

SCRAPERS
lower cost



2 LESS LOADING RESISTANCE

Low, wide bowl plays an important part in ease of loading. Since loading resistance is largely determined by the height to which the load is built, the lower, wider bowl of an Allis-Chalmers scraper requires less time and power to get the same yardage as other scrapers.

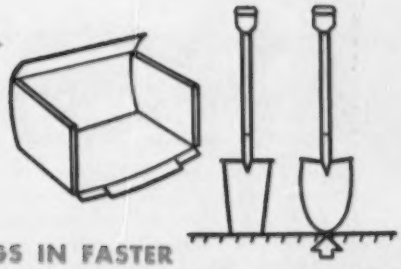


4 POSITIVE EJECTION ASSURES EVEN SPREADING

With patented linkage, apron lifts, then moves forward and up as ejector pushes foward. High apron lift prevents any possibility of material's jamming. Even when loaded from overhead, anything that can be put into the bowl can be easily ejected. Ejector returns to loading position automatically by spring action and apron weight.

• • •

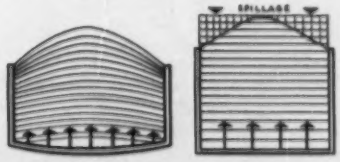
There is an Allis-Chalmers pull-type scraper for every tractor . . . every job. Write for literature or contact your Allis-Chalmers dealer.



1 DIGS IN FASTER

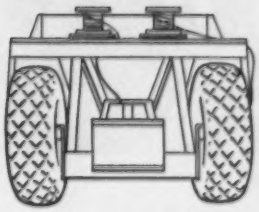
Curved and offset cutting edge on Allis-Chalmers scrapers concentrate all the tractor horsepower on the center section during initial penetration. The penetrating ability of a round-end spade helps illustrate the soundness of this Allis-Chalmers design.

Diagrams show how an automatically heaped load avoids costly spillage even though the center is built up above the sides of the bowl.



3 HEAPS AUTOMATICALLY

The combination of slightly deeper center cut and correctly angled cutting edge shapes the load as the scraper fills. The greater volume of dirt flowing into the center of the curved bowl "boils" forward, to the rear and to the sides, pulverizing the dirt, filling the voids and producing an automatically heaped load without excessive spillage.



5 HAULS, MANEUVERS EASILY

Big, low-pressure tires provide maximum flotation. The extra wide, low bowl keeps center of gravity low, helps the scraper hug the ground for safety. Front running gear has ample clearance at all points, high carrying position clears uneven ground.

Scraper main frame is shorter because exclusive linkage moves apron forward as well as upward to clear main frame at full height. The two-to-three feet shorter wheel base permits easier maneuvering. Scraper can turn in its own length.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

FAST PRODUCTION TEAM *for off-road hauling . .*

You get high-speed production on both excavating and hauling, when you team Koehring fast-shuttling Dumptors with Koehring heavy-duty shovels. Notice on the operation shown here how Dumptor spots in close under the Koehring ¾-yard 304 — keeps shovel swing short. Square body opening provides a big, easy-loading target — can be loaded over either end or side.

Shuttling back and forth between the shovel and the dump area, Dumptor travels round trip without turning. Constant-mesh transmission gives the same travel speeds in either direction — saves at least 2 slow turns on every haul cycle. This heavy-duty 6-yard hauler has better than 6 h. p. per ton of loaded weight — accelerates fast, pulls through soft ground and up grades with less shifting, climbs 24% grades fully loaded. One-second gravity dumping also saves time on every cycle. There's no 15 to 25-second wait for slow-acting hydraulic or electric body hoists — no expensive body hoist maintenance. What's more, gravity-dump never balks, never wears out.

Now, take a quick look at the other half of this heavy-duty team — the Koehring ¾-yard shovel. Its powerful digging crowd and fast swing are backed up by plenty of weight-stability to hold solidly to the grade. Automatic take-up and release of tension on the crowd chain assure maximum dig-in power at every boom angle. For all its powerful application, Koehring 304 booster clutch requires only ⅓ to ½ the lever pull of a straight manual clutch — yet retains accurate "feel" of load. Instantaneous dipper

QUICK FACTS ABOUT 304 WORK CAPACITY

As a heavy-duty shovel or hoe, this Koehring 304 has ¾-yard dipper capacity — 13.9-ton lift capacity as a crawler crane — 25-ton lift capacity on rubber-tired truck or cruiser mounting — readily converts to clamshell, dragline, pile driver.

. . heavy-duty digging

.rip that works *every time* is another of many Koehring features that step up shovel cycles, and give you more production every shift.

Consider what this combination of Koehring excavators and Koehring Dumptors can mean to you in overall operating efficiency, economy — and in time-saving convenience when you standardize on *one make* of equipment for all of your excavating and hauling. Get more information on Dumptors® and on the 5 sizes of Koehring heavy-duty excavators from your Koehring distributor today — or send for catalogs.

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Milwaukee 16, Wisconsin

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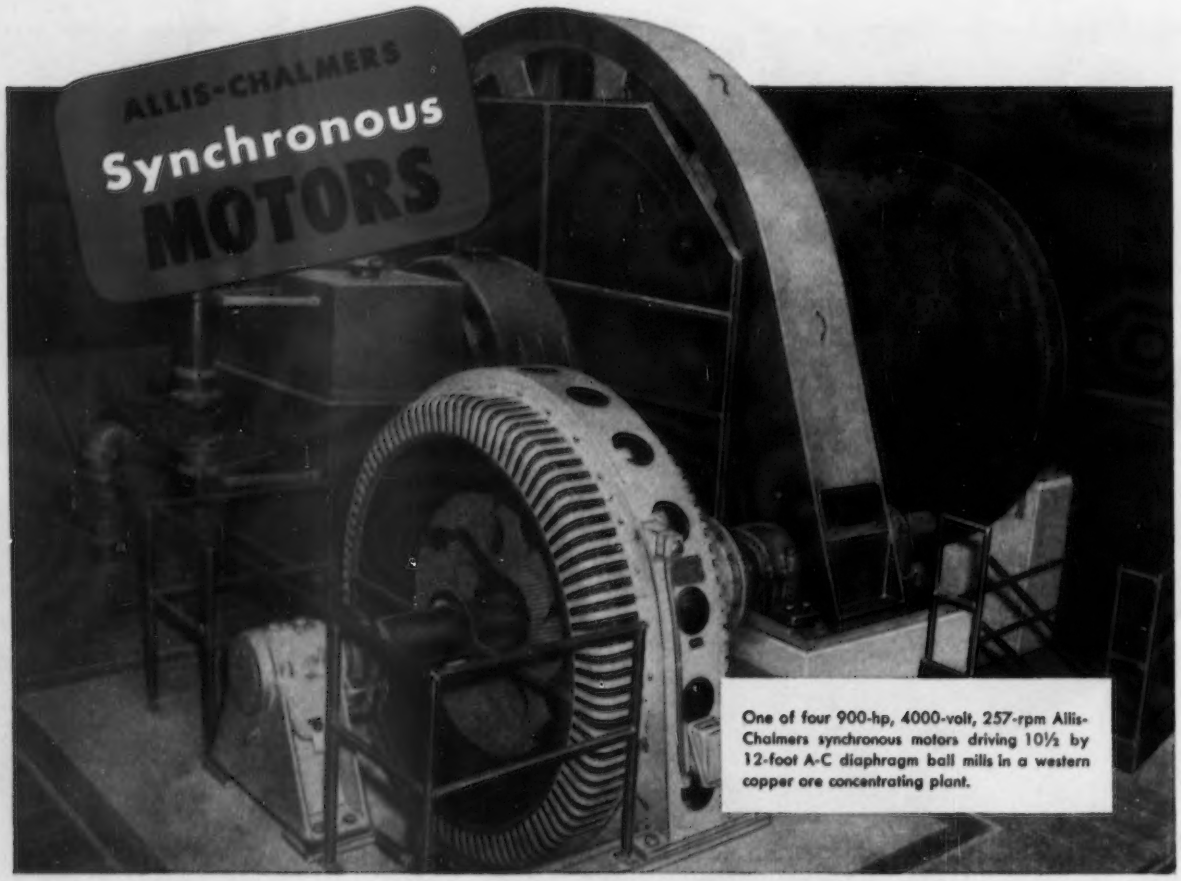

One of four 900-hp, 4000-volt, 257-rpm Allis-Chalmers synchronous motors driving 10½ by 12-foot A-C diaphragm ball mills in a western copper ore concentrating plant.

Here's Dependable Power for Grinding Mills

Motor design closely coordinated with grinding mill torque requirements and system power factor needs

Many cost-conscious operators, like this western copper ore concentrating plant, choose Allis-Chalmers synchronous motors for peak performance and low maintenance costs. Allis-Chalmers builds both processing machinery and the electrical equipment to drive it. Allis-Chalmers intimate knowledge of operating conditions is full assurance that the motors will not only meet daily operating requirements but will also handle unusual emergency conditions without faltering.

Allis-Chalmers has always been known for building the heavy-duty type of equipment that mining and processing plant operators need. This tradition of generous construction plus the latest in manufacturing, inspection and testing equipment gives you a motor that will deliver many years of economical, trouble-free service.

For more information on synchronous motors that keep costs down, call your Allis-Chalmers representative or write for Bulletin 05B7648. Allis-Chalmers, Milwaukee 1, Wisconsin.

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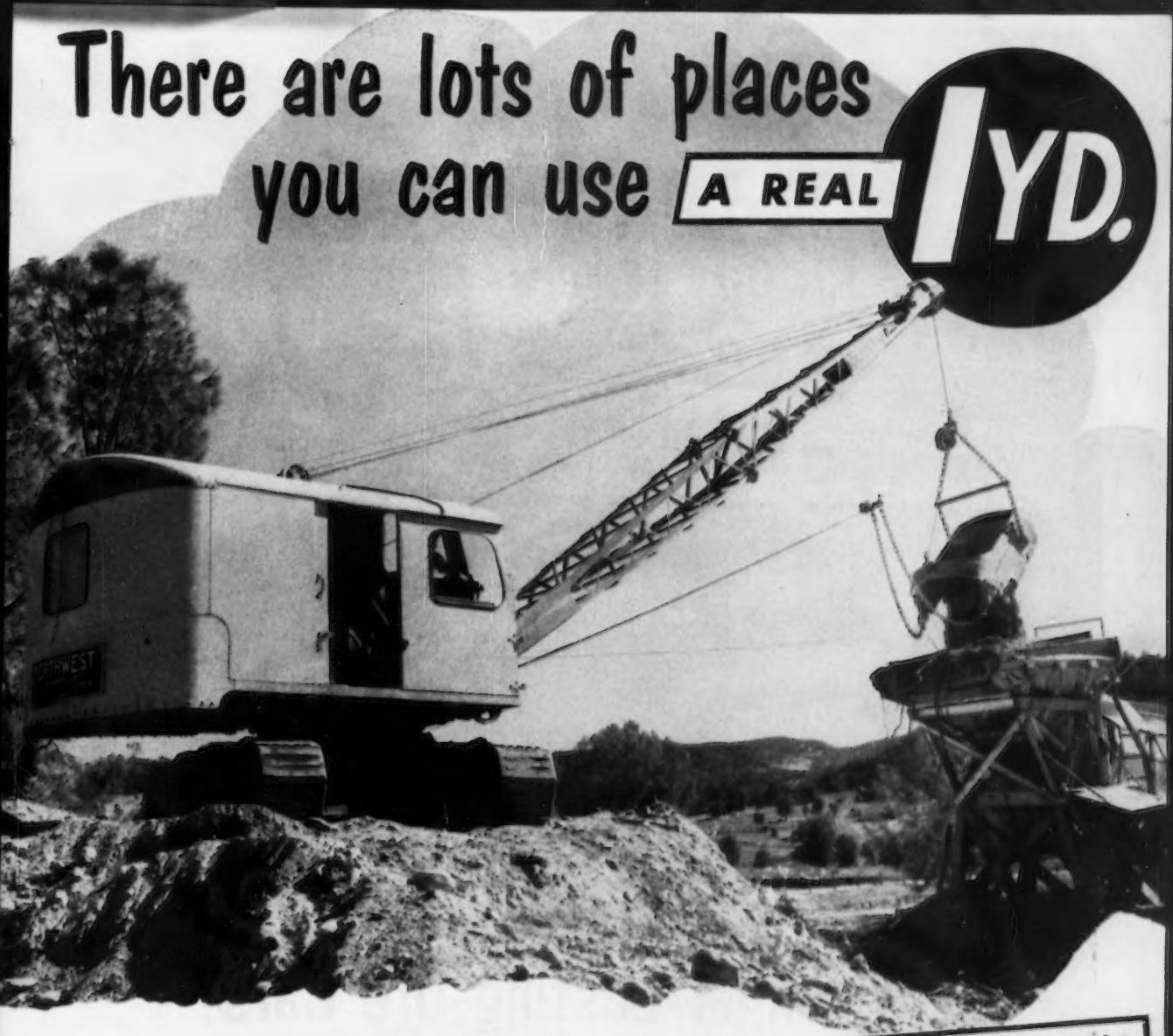
ALLIS-CHALMERS

There are lots of places you can use A REAL 1 YD.



● You may not be feeding a Doodle Bug but there are lots of places you can use a real 1 yd. Shovel, Crane or Dragline. And we mean a *real* 1 yd.

The Model 41 is a *real 1 yd.* machine built from the ground up as a real 1 yd., able to deliver what you expect from a 1 yd. machine.

The Model 41 will solve lifting and loading problems around the mill. It will build roads and handle drainage work. It will clean out ore pockets and fill in on dozens of other places. It's convertible, of course, from Shovel to Crane, Dragline or Pullshovel by simply changing booms. There is no other 1 yd. rig like it. Ask for a catalog and full details and talk it over with a Northwest Man.

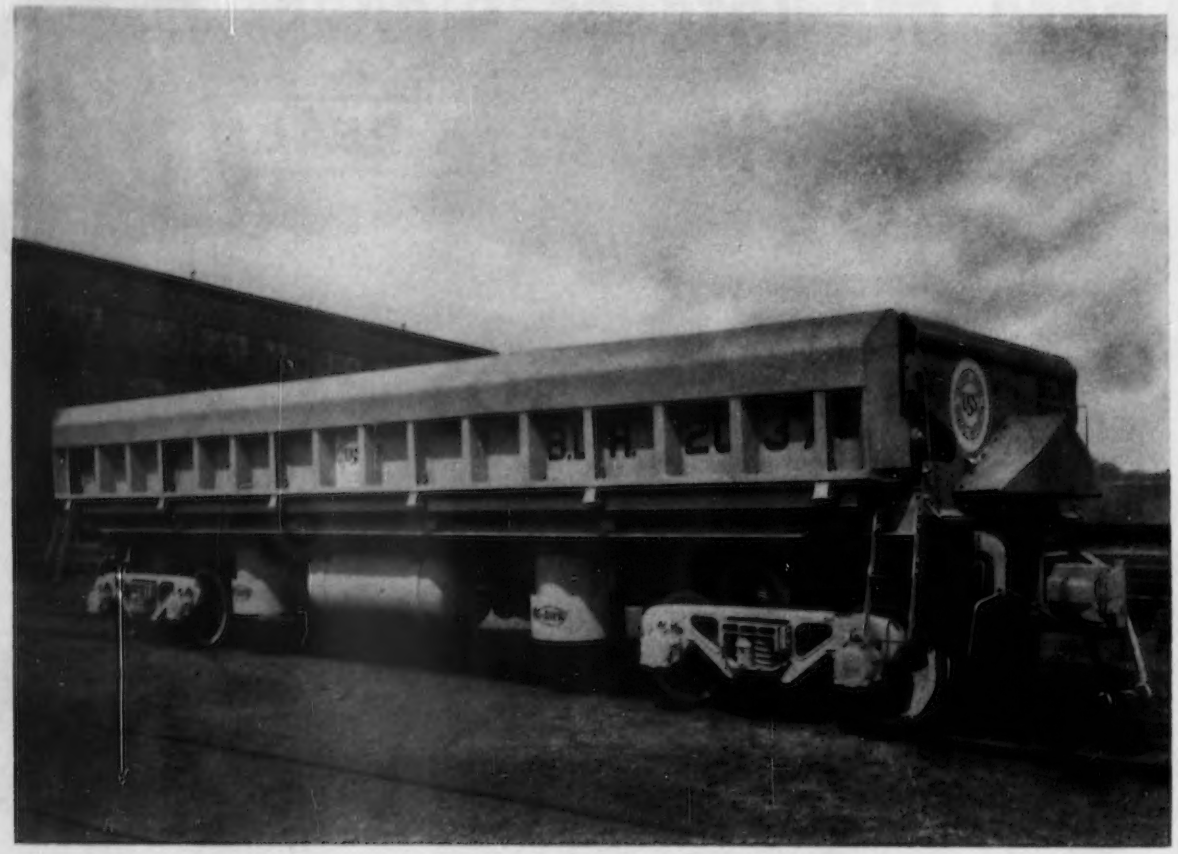
ASK ABOUT THE MODEL 41

NORTHWEST ENGINEERING COMPANY
1509 Field Bldg., 135 South LaSalle Street, Chicago 3, Illinois

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

YOU CAN'T HAVE NORTHWEST ADVANTAGES UNLESS YOU OWN A NORTHWEST



Stands the Gaff. Increase the life of your mine car bodies by designing them to utilize high strength, low alloy steels containing nickel. The car body shown here is one made from TRI-TEN steel, a product of United States Steel Corp., Pittsburgh, Pa. TRI-TEN steel is widely used to meet demands for ruggedness and strength where minimum weight is also a requirement.

Want Longer Lasting Ore Cars?

Bodies withstand impact, abrasion and corrosion when made of high strength, low alloy nickel steels

DON'T INCREASE SECTION THICKNESS to lengthen life of ore car bodies...

Don't add deadweight to strengthen them, even where battering and corrosion now breed maintenance problems...

Increase car life, and at the same time cut maintenance, by utilizing high strength, low alloy steels containing nickel.

These steels give you 50% greater yield point than structural carbon steel. Especially important, they retain a high degree of their original strength during years of use because the resistance they offer to atmospheric corrosion is three times that offered by carbon steel.

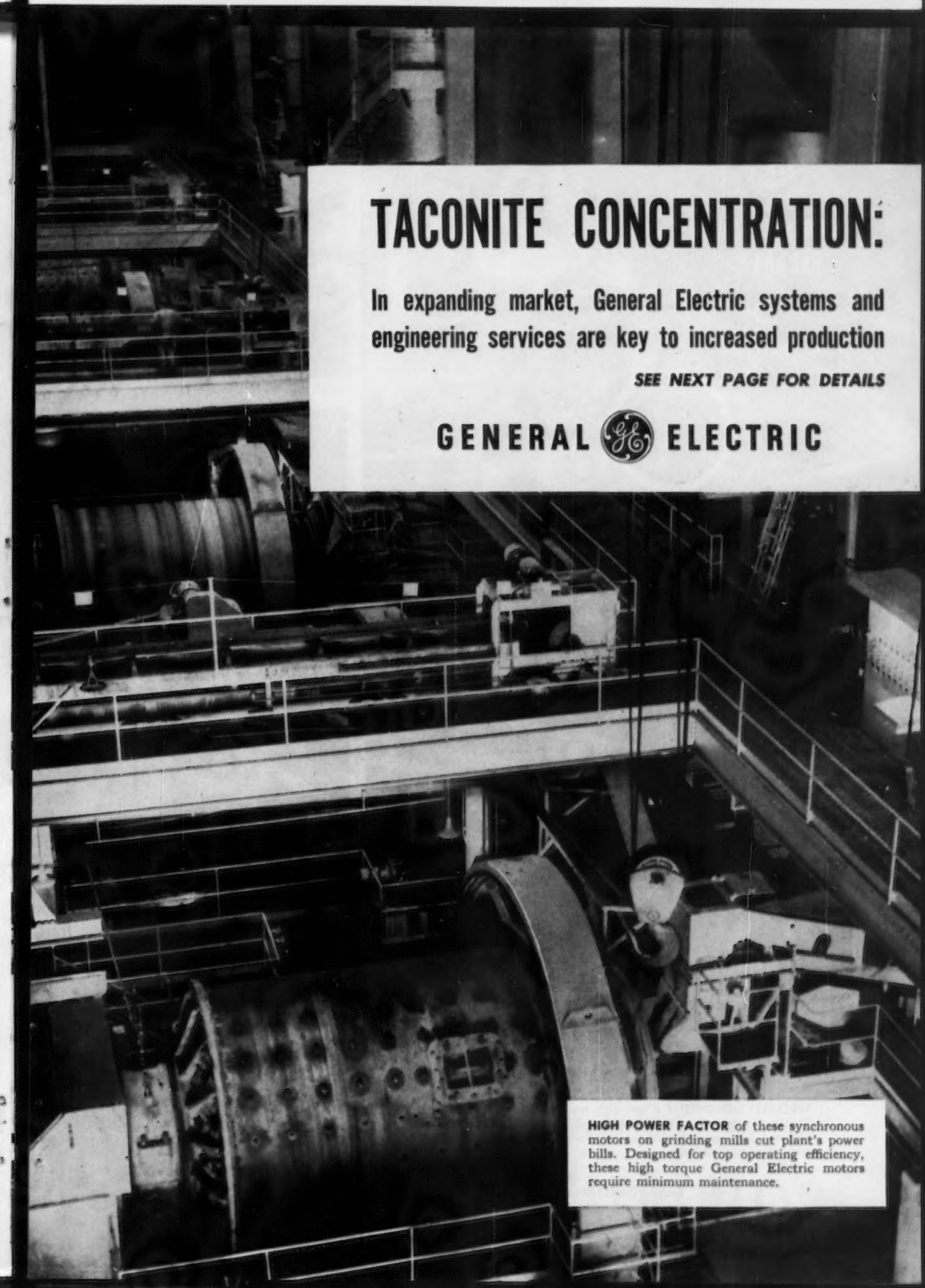
In addition, low alloy nickel steels distinctly excel structural carbon steels in resisting impact, wear and abrasion.

Take full advantage of the properties these low alloy nickel steels offer you.

Every mine operator should have a copy of "Nickel-Copper High-Strength, Low-Alloy Steels." It discusses design factors that help you cut weight. It explains why these nickel alloy steels provide superior resistance to atmospheric and many other types of corrosion. It describes their behavior in fabrication.

Write for your copy now. INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.



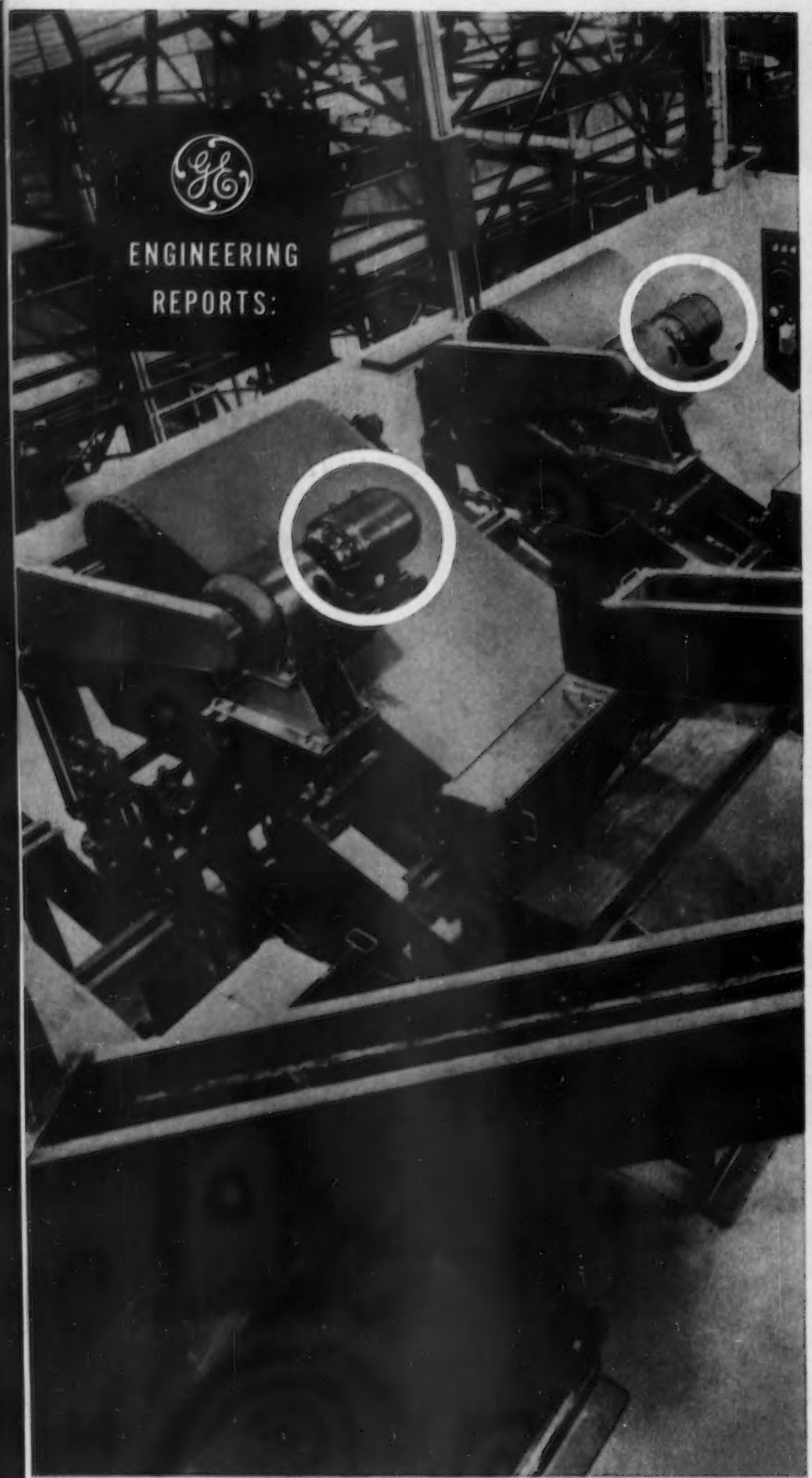
TACONITE CONCENTRATION:

In expanding market, General Electric systems and engineering services are key to increased production

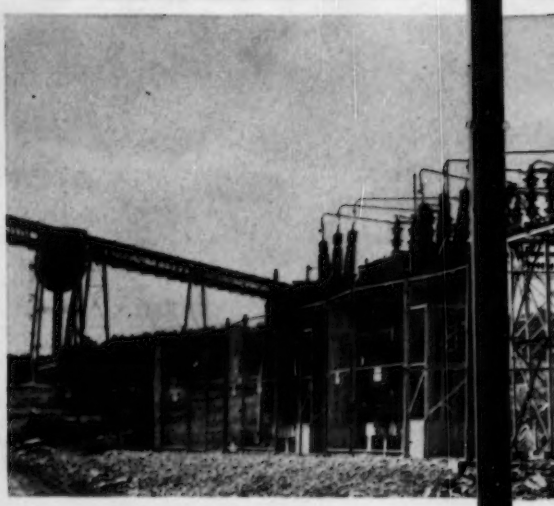
SEE NEXT PAGE FOR DETAILS

GENERAL ELECTRIC

HIGH POWER FACTOR of these synchronous motors on grinding mills cut plant's power bills. Designed for top operating efficiency, these high torque General Electric motors require minimum maintenance.



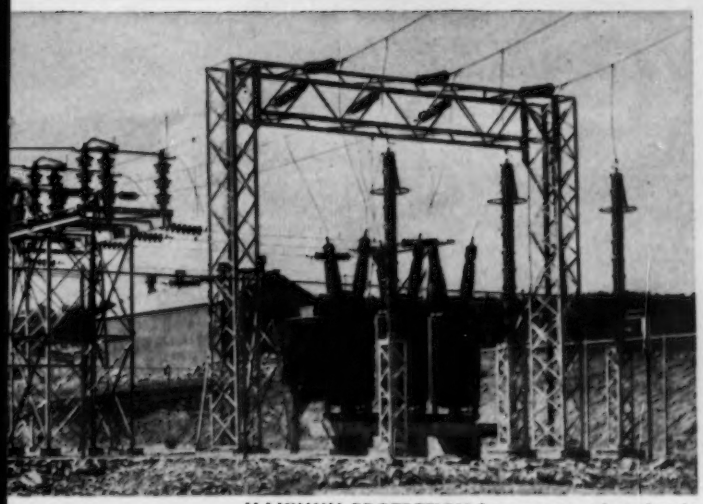
SPECIALLY-DESIGNED for taconite concentration service, rugged G-E Tri-Clad* motors have been fully tested in the taconite field. These totally enclosed, fan-cooled motors are built for long operating life and a minimum amount of maintenance.



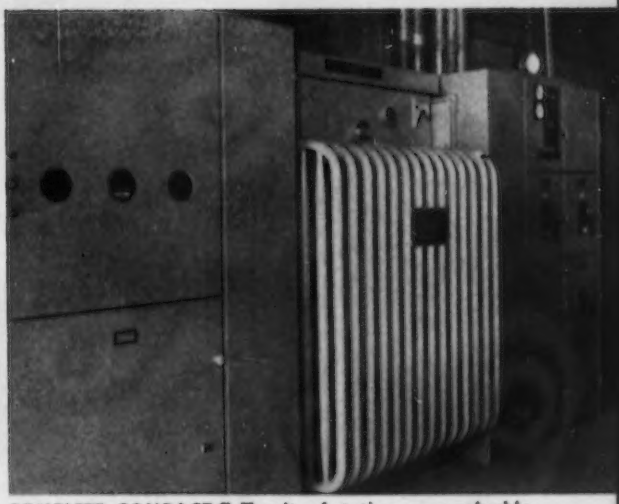
EXPERIENCED G-E ENGINEERS save you time and money in the planning, delivery, and installation of your electrical system.

EASY-TO-INSTALL G-E Cabinetrol* control centers are delivered factory assembled. Located in ventilated control rooms, they give centralized control for plant operations.

*Reg. trade mark of General Electric Co.



MAXIMUM PROTECTION for concentration plant's distribution system is assured by G-E packaged substations. They are designed with standard components to meet individual requirements



COMPLETE, COMPACT G-E unit substations save valuable floor space. They provide power for round-the-clock operation of plants. Factory assembled, they are easy to install and can be expanded with ease.

G-E electrical systems and engineering services help

INCREASE TACONITE CONCENTRATE OUTPUT

Taconite concentration uses power, and lots of it. And, with the production of iron ore concentrates expected to increase 30 times by 1970, the importance of a flexible co-ordinated electrical system cannot be overlooked. For the key to top production in taconite concentrators is a co-ordinated electrical system which incorporates all electric equipment into a smoothly functioning unit. To help you plan your system, General Electric offers these engineering services.

APPLICATION ENGINEERING:
G-E Engineers, experienced in the taconite processing field, will work with you, or your consulting engineers. They will help design an electrical system to fit your individual needs today, which can be readily adapted in future expansions.

PROJECT CO-ORDINATION:
G. E. will co-ordinate selection, delivery and installation of all electric equipment to assure that the right equipment arrives at the right time.

FIELD ENGINEERING:
Field Engineers are available to assist with the installation and start-up of your electrical system.

PRODUCT ENGINEERING:
Extensive tests in taconite plants and research laboratories are conducted by G-E Product Engineers to assure that G-E electric equipment is designed to meet the rugged requirements of taconite service.

These G-E engineering services are designed to help you get the best electrical system for your particular needs. They will also save you time and money in the ordering, delivery, and installation of your electric equipment. For more information about G-E electrical systems and services, contact an Apparatus Sales Representative at your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 660-31

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC

lated control rooms, they give centralized control for plant operations. *Reg. trade mark of General Electric Co.

Now

...4 tons more capacity at no extra cost

Check these improvements:

4 tons more capacity

Payload of the C Tournapull Rear-Dump has been raised from 18 to 22 tons! Increase was made possible by redesigning the Rear-Dump body to make it lower and wider. Because of this greater width, the "C" loads faster and easier than ever before. At the same time, we have reinforced the bowl to further increase our safety margins. These improvements, plus all the others described here, are available on the new "C" at no extra cost to you.

Better gradability, stability

New body design shifts weight forward . . . improves gradability over the previous C Rear-Dump. With this improvement, "C's" grade-climbing ability now compares favorably with any make hauler on any practical haul road. Wheelbase has been increased 6 in., gauge widened to 9 ft., and ground clearance lowered to 22 in. to give you even greater stability . . . improved performance on grades. Overall length in haul position, however, is only 30 ft.

13 to 20% less deadweight

Comparable rear-dumps carry from 2½ to 4 tons of excess iron on their backs. For these extra tons of iron you pay from $850 to $5600 more than for a "C". You haul this extra dead-weight both ways on every trip your hauler makes, but add nothing to your earnings. For the life of the machine it costs you bigger fuel bills, higher tire costs due to over-loading, plus greater repair expense because of extra weight and shock on running gear.

GENERAL ELECTRIC

"C" Rear-Dump now 22 tons

12% greater horsepower

To power your improved "C" Rear-Dump, you now have a 6-cylinder GM 6-71 diesel with brake horsepower rating of 208 hp at 2000 rpm. With this improved engine, you get quick pickup in starting and gear changes . . . better response at high speeds . . . better grade-climbing ability . . . all adding up to overall faster cycles. 200 hp Buda or Cummins diesels are also available. And, you have choice of sliding-gear or constant-mesh transmissions.

In addition to many improvements in structure and machinery throughout, you get all these job-proved basic features which made the previous C Rear-Dump a successful production unit:

Hauls anywhere — With big rubber tires, Rear-Dump safely travels narrow haul roads, paved highways, city streets . . . hauls cross-country over roughest terrain, through mud, and soft fills.

Reduces maintenance — Because Rear-Dump has no hydraulics, no jack lines, no long drive-shaft, no frame, sub-frame, springs or tie rods, most common troubles of conventional rear-dump haulers are eliminated.

Dumps fast, clean — A touch of a switch activates hoist motor. Body lifts quickly, swings behind rear wheels to dump clean over bank. Streamlined bowl sheds material readily.

Cuts weather delays — Power transfer differential automatically applies power to drive wheel on firmest footing . . . pulls unit through mud, sand, and soft materials which stop ordinary haulers. It's a Tournapull exclusive.

Works fast in tight quarters — 90° turns within a radius of half of unit's length, plus power steer, quickly position "big-target" body under dipper. No switching back and forth, no turntables.

Eliminates manual work — Finger-tip electric controls on instrument panel activate electric motors at point of action. Heavy manual work fighting steering and control levers is eliminated.

Resists body shock, damage — Three-layer, all-steel, grid-type bowl with tool-steel floor resists loading shocks. Big, wide bowl opening is an easy target for any loading unit.

Improves safety — Multi-disc air brakes have more breaking surface on one wheel than most haulers have on 4. Low center of gravity, good visibility, front-wheel drive, easy control also boost safety.

Delivers full power — Torque converter (optional) automatically balances load and torque so you get full hp always. Lugging is reduced; shocks between engine and transmission virtually eliminated.

Reduces fatigue — Big low-pressure tires and air-foam rubber cushion seat smooth out ride for operator. Push-buttons control every action. Fatigue factors are greatly reduced.

Insures future earnings—Behind Tournapull prime-mover, you can interchange scraper, bottom-dump, other trailing units. With them, you always keep these units profitably busy on any type of future operation.

Check for yourself. Your LeTourneau-Westinghouse Distributor will supply you with names of Tournapull Rear-Dump owners in your area. Visit the jobs . . . talk to the operators . . . learn for yourself that improved C Tournapull Rear-Dump is the answer to your hauling problem.

There is a size to fit your needs. Besides the 22-ton "C", LeTourneau-Westinghouse offers similar 9, 35, and 50-ton models.

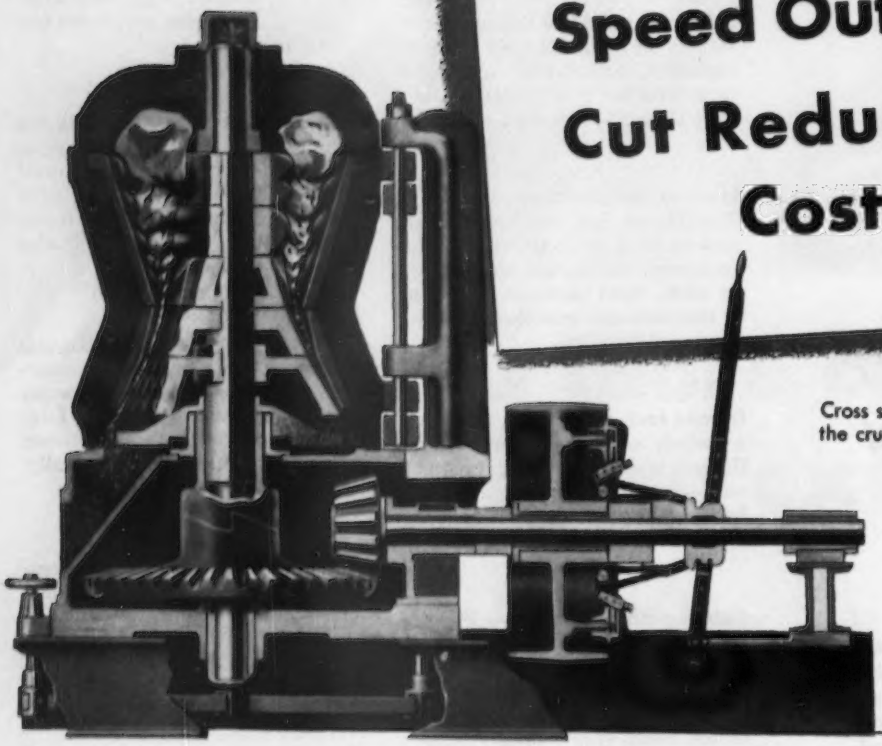
Tournapull—Trademark Reg. U.S. Pat. Off. R-765-O

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Here's How to Speed Output... Cut Reduction Cost



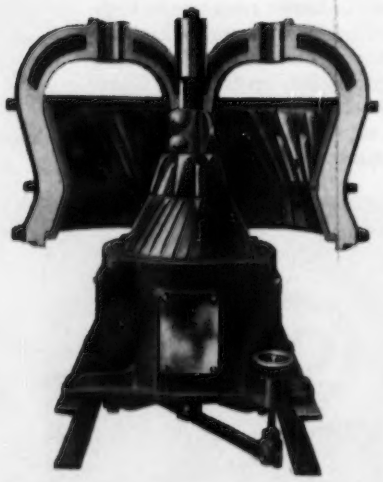
Cross section view illustrating the crushing action.

Use STURTEVANT Rotary Fine CRUSHERS

With the Sturtevant Rotary Fine Crushers you can crush or granulate to even sizes without excess dust. By simply turning the handwheel, the crusher can be quickly regulated to crush down to approximately ¼" and finer, or opened up to produce 1" size of finished product.

"Open-door" accessibility permits fast, easy, thorough cleaning.

Sturtevant Rotary Fine Crushers crush fast... do not clog. Available in output capacities from 1 to 30 tons per hour.



Sturtevant Mill Company

101 CLAYTON STREET, BOSTON 22, MASSACHUSETTS

Designers and Manufacturers of

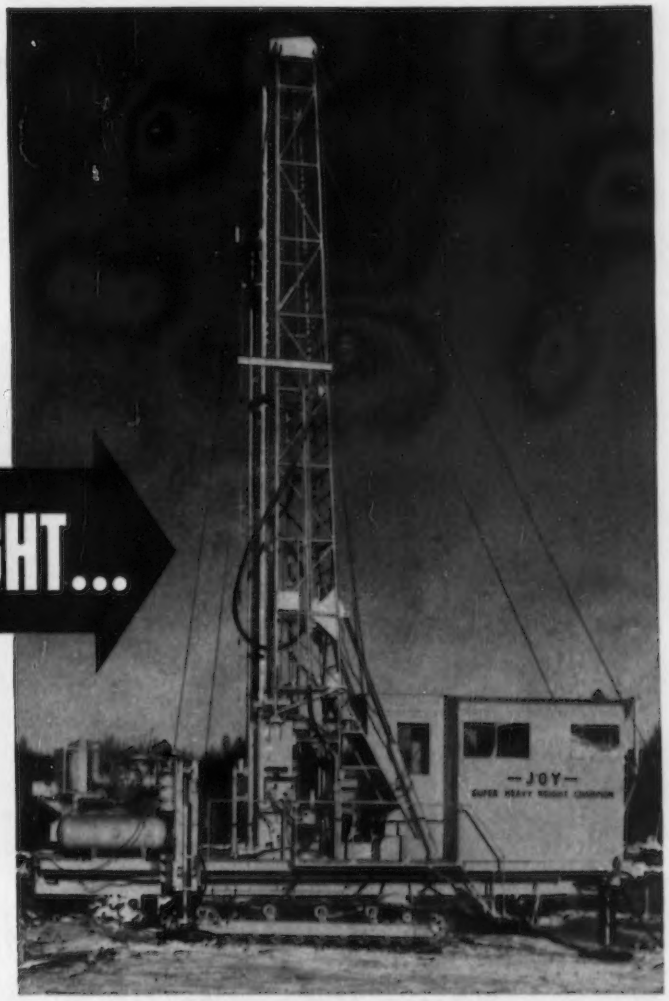
CRUSHERS • GRINDERS • SEPARATORS
CONVEYORS • MECHANICAL DRYERS and
EXCAVATORS • ELEVATORS • MIXERS

MEET "BIG BROTHER"

... the New JOY

SUPER HEAVYWEIGHT...

CHAMPION BLASTHOLE DRILL



Here is the new, *larger,* heavier Joy Champion Rotary Blasthole Drill . . . the "big brother" of the Middleweight and Heavyweight Champions, the Joy drills which pioneered revolutionary rotary-air blast drilling. It is designed specifically for large (9″ to 12″) hole-drilling in harder rock.

Proof of its ability to tackle the toughest open cut mining and quarry jobs is the record of the unit illustrated. This Super Heavyweight has been performing very satisfactorily in the hard taconite formations of the Minnesota Iron Range.

The Super Heavyweight is a rugged, heavy duty, low maintenance machine, built to last and produce. Write, now, for complete details to *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

Check these super heavyweight features:

DRILLS DRY . . . No freezing water lines, no costly water hauling.

NO LOST HOLES . . . Rigid drilling stem, controllable feed pressure, infinitely variable rotation speed prevent bit wander.

QUICK SETUP . . . *Hydraulically raised mast* and hydraulic levelling jacks.

DRILLS CLEAN . . . Continuous, instant removal of cuttings by a blast of compressed air.

HYDRAULIC CHUCK . . . Full automatic and self-aligning.

AMPLE WEIGHT . . . Enough to handle big 9″ to 12″ holes.

Consult a Joy Engineer

for AIR COMPRESSORS • ROCK DRILLS • WAGON DRILLS
CORE DRILLS • BLASTHOLE DRILLS • PORTABLE HOISTS
FANS • BLOWERS • HYDRAULIC HOSE AND COUPLINGS

W4DM5542

JOY

PIONEER AND WORLD'S LARGEST
MANUFACTURER OF ROTARY BLAST HOLE DRILLS

the MARCY* principle of grinding...

"rapid change of mill content is necessary for high efficiency"

This basic principle of grinding is incorporated in all Marcy mills and has proved, in hundreds of installations, to give ***greater output with lower KWH per ton.***

MARCY GRATE DISCHARGE

The "rapid change of mill content" is accomplished by use of the Marcy fullgrate discharge on ball mills and the open end feature on Marcy rod mills. This results in a low pulp line which provides an active, *effective* grinding mass to act on particle size reduction *only*...there is no wasteful cushioning action by high pulp levels. There is a faster migration of fines than oversize particles, thus less overgrinding.

operating proof of Marcy Mill superiority

(typical tests conducted independently by operating companies)

LOCATION	Mill Size I.D. Shell Dia. x Length	DISCHARGE	RPM	% C.S.	HP Input	Tons Per 24 Hrs.	KWH Per Ton	% Gain Capacity	% Power Increase	GRIND	% Capacity Overflow Mill Compared to Grate Mill
Arizona	10½ x 11	Overflow	16.6	77.6	665	1610	7.40			12% + 48 M.	87
	10½ x 11	Grate	16.6	77.6	700	1850	7.02	15	5.2		
Colorado	6½ x 6	Overflow	25	79.1	102	160	11.5			11% + 65	70
	6½ x 5½	Grate	25	79.1	112	226	8.9	41.3	9.8	10% + 65	
Idaho	6½ x 4½	Overflow	25	79.1	75	98	13.7			1% + 65	77
	6½ x 4½	Grate	25	79.1	91	127	12.8	29.6	21.3	1% + 65	
Mexico	8 x 6	Overflow	22	80	180	660	5.1			Open Circuit	75
	8 x 6	Grate	22	80	230	880	4.6	33.3	22.3		
Arizona	8 x 6	Overflow	22	80	197	646	10.89			6% + 48	70
	8 x 6	Grate	22	80	242	928	9.34	43.7	22.8	5% + 48	
Canada	6½ x 14½	Overflow	24.5	81	323	1117	5.17			8% + 65	78
	6½ x 14½	Grate	24.5	81	390	1430	4.88	28.0	20.7	7% + 65	
Colorado	9½ x 7	Overflow	19	74.5	287	900	5.7			35% + 100	81.7
	9½ x 7	Grate	19	74.5	338	1100	5.5	22.2	17.8	35% + 100	
Canada	6½ x 12½	Overflow	18.5	59	274	945	5.2			15% + 65	73.4
	6½ x 12½	Grate	18.5	59	331	1289	4.6	36.4	20.8	15% + 65	

Write for NEW CATALOG No. 101A

*Marcy is a registered trademark.

The Mine & Smelter Supply Co.

DENVER 17, COLORADO

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

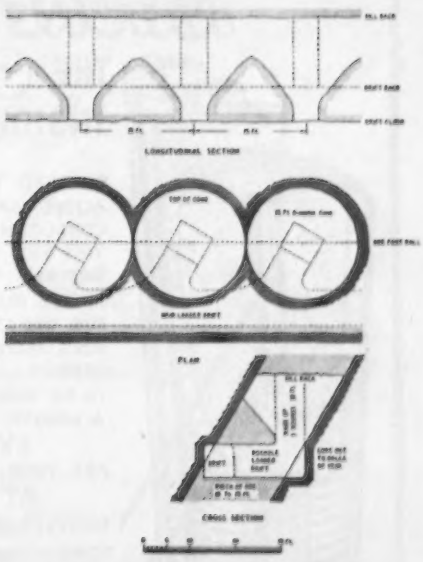
INCREASE PRODUCTION LOWER COSTS

Yes! You can increase production and lower costs by using Eimco loaders to load your production tonnage.

The advantages of being able to load larger pieces, use less powder, practically eliminate secondary blasting and absolutely eliminate expensive chutes and grizzlies, will enable your mine to get into production in a new area faster at less expense.

That's why so many mining men are traveling to see mines that have changed their systems to production loading with Eimcos.

Many different ideas for saving time and lowering costs have been developed by operators to fit their particular conditions. A sketch of one of these is at right. Eimco engineers have helped work out numerous systems, they will be glad to help you. Write Eimco for information.



THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

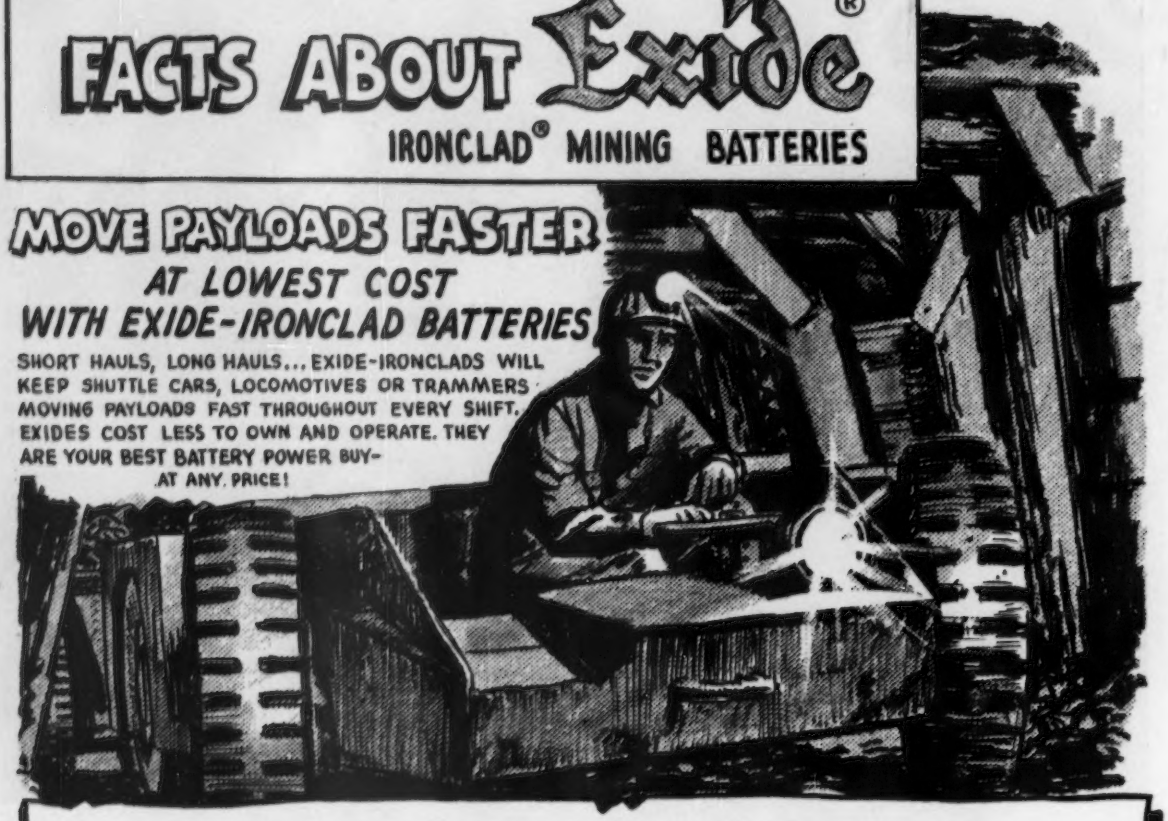
You Can't Beat An Eimco

FACTS ABOUT Exide®

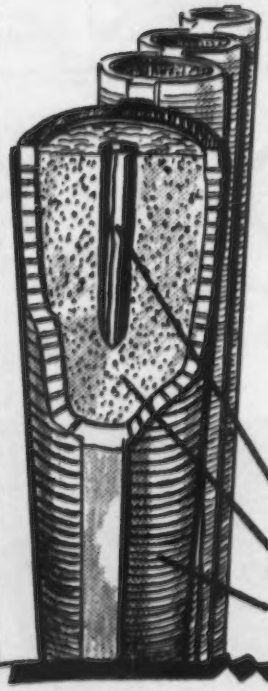
IRONCLAD® MINING BATTERIES

MOVE PAYLOADS FASTER
AT LOWEST COST
WITH EXIDE-IRONCLAD BATTERIES

SHORT HAULS, LONG HAULS... EXIDE-IRONCLADS WILL KEEP SHUTTLE CARS, LOCOMOTIVES OR TRAMMERS MOVING PAYLOADS FAST THROUGHOUT EVERY SHIFT. EXIDES COST LESS TO OWN AND OPERATE. THEY ARE YOUR BEST BATTERY POWER BUY— AT ANY PRICE!



NATURE'S IDEAL SHAPE
THE CIRCLE WORKS FOR YOU INSIDE AN EXIDE-IRONCLAD



SLOTTED TUBES INSIDE AN IRONCLAD KEEP ACTIVE MATERIAL IN FIRM CONTACT WITH CONDUCTING GRIDS OF THE POSITIVE PLATE... THIS GRID PROTECTION LENGTHENS LIFE OF BATTERY. THE SLOTTED TUBES EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... FOR GREATER POWER. FINE TUBE SLOTS HOLD MATERIAL IN CONTACT WITH GRID LONGER... RESULT, THE IRONCLAD'S ABILITY TO DO YOUR MINE HAULAGE JOB FOR A LONGER PERIOD OF TIME. THAT IS WHY

EXIDE-IRONCLADS

ARE YOUR BEST MINING BATTERY BUY—

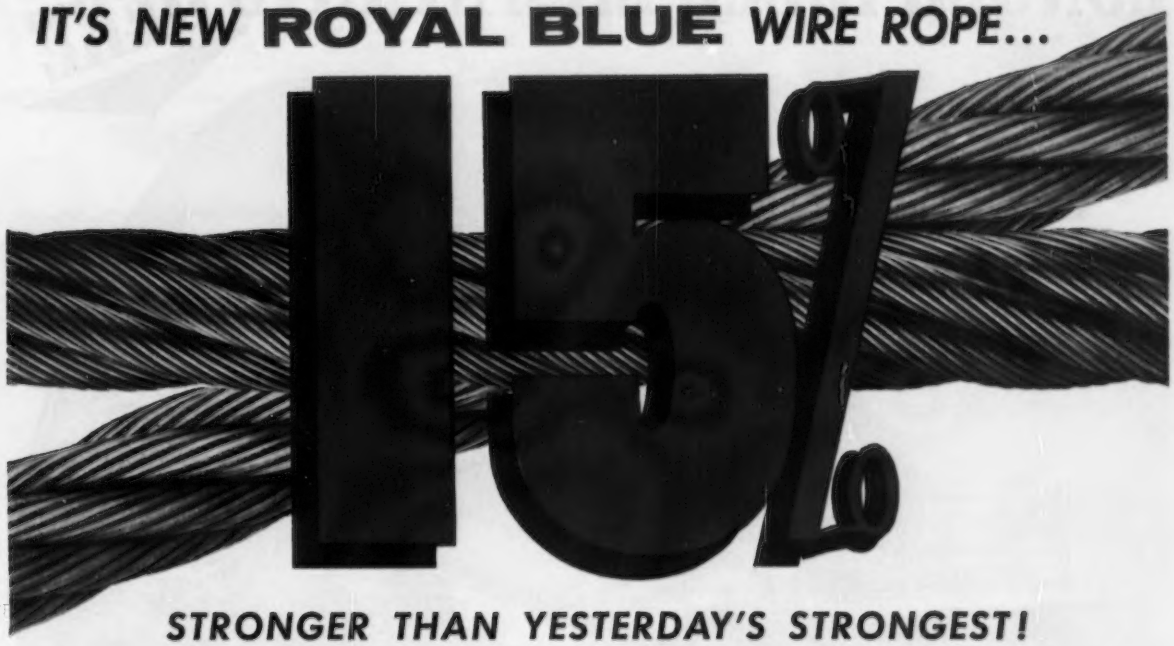
AT ANY PRICE!

IRONCLAD POSITIVE PLATE

LET EXIDE HELP SOLVE YOUR MINING BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 1982, A MANUAL ON MAINTAINING MOTIVE POWER BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

ROEBLING ANNOUNCES TO AMERICAN INDUSTRY IT'S NEW ROYAL BLUE WIRE ROPE...



STRONGER THAN YESTERDAY'S STRONGEST!
VASTLY INCREASES — EVEN DOUBLES — SERVICE LIFE!

WITH THE DEVELOPMENT of Roebling type 1105 wire — the finest high carbon rope wire ever produced — Roebling leads the field in bringing American industry the unprecedented efficiency and economy inherent in its new **ROYAL BLUE** Wire Rope.

★ Roebling is ready to supply the new **ROYAL BLUE** Wire Rope in EVERY DIAMETER from ¼" to 3½" and in EVERY STANDARD CONSTRUCTION with an independent wire rope core.

★ Roebling guarantees **ROYAL BLUE** Wire Rope to be at least 15% stronger than any standard wire rope of the same size and construction formerly available.

★ Roebling **ROYAL BLUE** Wire Rope has unequalled resistance to impact, crushing, abrasion and fatigue.

Write us for the full story on **ROYAL BLUE** Wire Rope, or contact your distributor or nearest Roebling branch office.

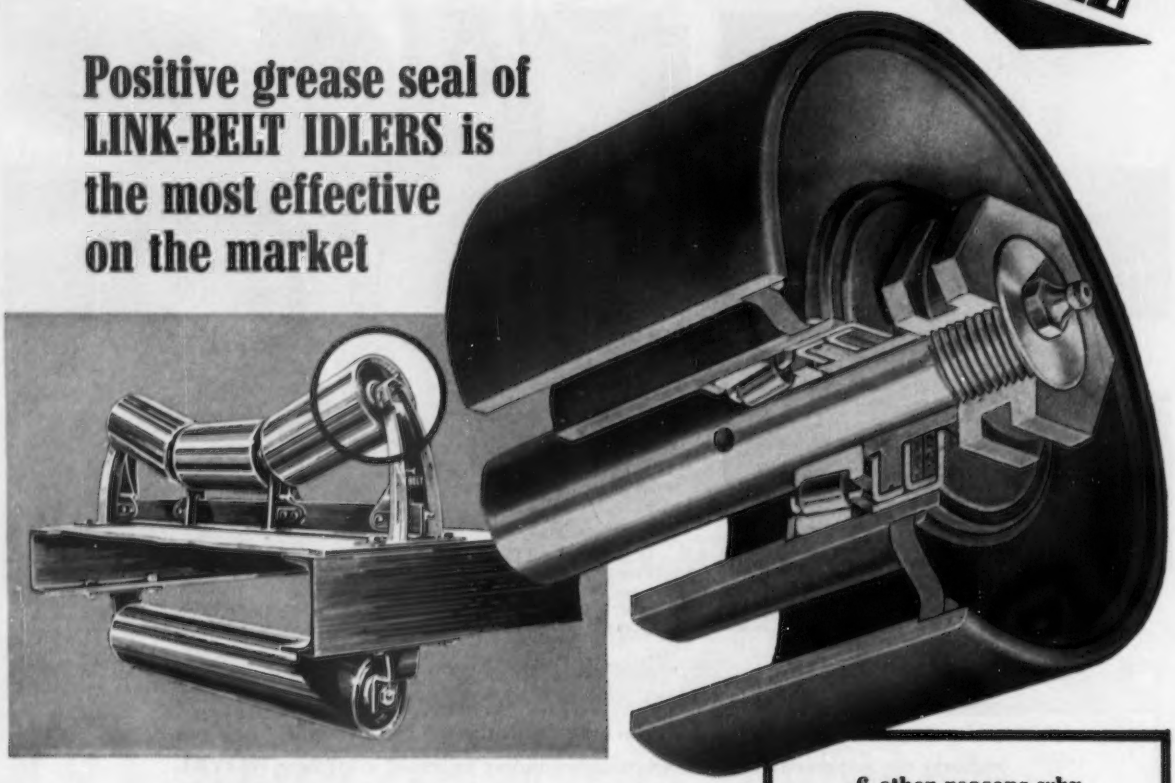
ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 924 AVON AVE. • BOSTON, 81 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

LONGER IDLER LIFE STARTS *HERE*

Positive grease seal of LINK-BELT IDLERS is the most effective on the market



NO BELT CONVEYOR IDLER is any better than its bearings. And no bearing outlasts its grease seals. That's why the seals on Link-Belt roller bearing idlers are so important to you.

The result of many years of intensive laboratory and field testing—the positive Link-Belt seal excludes dirt and moisture—retains lubricant. Felt and neoprene are combined with steel retainers and spacing collar to make an accurate cartridge labyrinth seal. There are no springs, no loose washers, no possibility of metal-to-metal contact.

And this is just one of the many engineering extras that make Link-Belt Idlers last longer. Check the box at right. Then ask your nearby Link-Belt office or distributor for a copy of new 48-page Book 2416. See for yourself how industry's most comprehensive line of idlers can mean lower handling costs for you.

6 other reasons why LINK-BELT IDLERS cut handling costs

1. **HUSKY, HIGHEST QUALITY BEARINGS,** free and easy turning, assure maximum life, minimum belt-wear, low power consumption.
2. **SAFE, CONVENIENT GREASE FITTINGS** provide ease of lubrication—lubrication for longer life.
3. **CONCENTRIC ROLLS** have smooth surfaces and rounded edges. Machine-made, continuous welds prevent entrance of dirt and moisture.
4. **OUTER SHELL COUNTERBORES AND COUNTERBORES AND JOURNAL** of the heavy 3/16" thick wall bearing retainer tubes with the press fits of the roll head assures hop-free rotation.
5. **STRONG, RIGID FRAMES** support rolls in perfect alignment. Rolls are securely held in place but can be easily removed for inspection and service.
6. **GROOVED HEX NUTS** lock into malleable brackets, creating truss effect—prevent shaft rotation and bracket spreading under both vertical and impact loads.

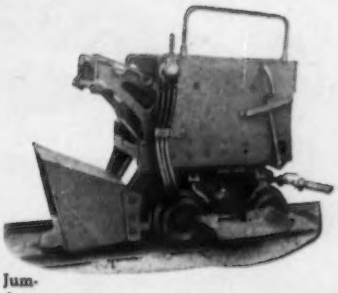
LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 19.822

Low-cost development and production with engineered deep hole percussion drilling equipment. Deep Hole Drills, Ring Seal Shank, Long-Feed Mountings, Sectional Rods and Couplings. Bulletin DHPD-1.

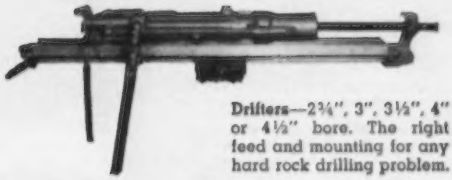
Compact and efficient air compressors.



Mine Car Loaders — fast, powerful, safe.

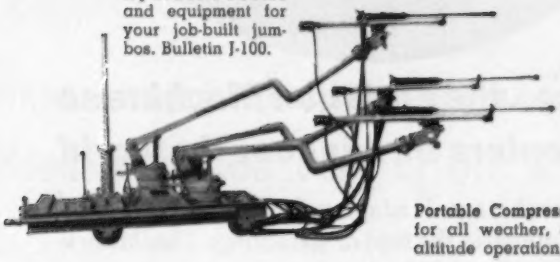
Stopers — direct or telescopic - direct feed leg. Two sizes: 2¾" and 3⅛".

Sinkers—hand-held or feed-leg mounted. The right combination for every rock.



Drifters—2¾", 3", 3½", 4" or 4½" bore. The right feed and mounting for any hard rock drilling problem.

Hydraulic Drill Jumbos. *Tractor Jumbos.* Hydraulic Booms and equipment for your job-built jumbos. Bulletin J-100.



Portable Compressors for all weather, any altitude operation.

Increase Your Mining Profit with help from Gardner-Denver

Drill Steel Sharpeners. Low-cost steel forming.

A Sump Pump that won't bury itself in mud.

Duplex Power Pumps for mine de-watering and water supply. Grout Pumps, air or steam operated.

High torque Airslushers and Air Hoists.

Write for descriptive information.

SINCE 1859

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

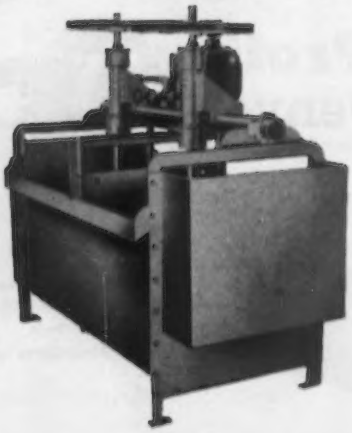
Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada) Ltd., 14 Curity Avenue, Toronto 16, Ontario

AGITAIR IS THERE!

You can choose with assurance..the Flotation Machine so successfully used in mining centers throughout the world

Agitair Flotation is used in so many farflung places because it adapts so readily and efficiently to the varied problems of ore beneficiation encountered in the field of metallurgy. Flexibility is the key to its remarkable success. Its mill application to all basic metals is now engineering routine. Its capacity to meet unusual demands is a challenge it welcomes.



Planned to fit the plant

Cell capacities and connected unit assemblies meet the physical requirements of all mills . . . large or small. Its recovery quotient is high . . . its power consumption low. Simple design and rugged construction insure long, trouble-free use. For complete information on AGITAIR, write your request today.

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Agents In All Principal Foreign Mining Districts

THE GALIGHER CO.

METALLURGICAL DIVISION · THE GALIGHER COMPANY · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

This S-A 1412-foot conveyor at Chuquicamata's oxide plant has moved nearly 200,000,000 tons of crushed ore since 1926 without major replacements or repairs. The unique "tip-back" feature of these S-A "444" Carriers allows them to be inspected without shutting down the belt.

NEW CHUQUICAMATA SULFIDE PLANT

Handles 30,000 Tons of Ore A Day on S-A Belt Conveyors

The Chile Exploration Company's Chuquicamata plant has been called one of the largest and best engineered mining jobs in the world. An outstanding feature is the materials handling system.

In planning this system, the company had the record of its older oxide plant to go by. Here more than 2500 S-A "444" heavy duty carriers have been in service for *over a quarter of a century.* All of the original S-A "444" carriers are in the multi-million ton class and are still on the job.

Because of this impressive performance, S-A "444" Carriers were specified for the miles of belt conveyors installed at the new Chuquicamata sulfide plant. While relatively expensive to begin with, their ability to take punishment year after year means lower handling cost per ton.

The same kind of performance that dictated Chuquicamata's choice of S-A Carriers is your assurance of lower costs, least maintenance and unfailing service when your belts travel on S-A Carriers. Write to have an S-A engineer call upon you —or send for our Carrier Bulletin No. 2-C.

These "Mammouth" carriers are probably the largest anti-friction units ever built. Equipped with double roller bearings they are designed to meet extremely rugged operating conditions.

"444" CARRIER

STEPHENS-ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Ill. • Los Angeles, Calif. • Belleville, Ontario

Engineering Division
Specialists in the design and manufacture of all types of bulk materials conveying systems.

Standard Products Division
A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

SealMaster Division
A complete line of industrial ball bearing units available in both standard and special housings.

Here's what we mean by LOW-COST MAINTENANCE

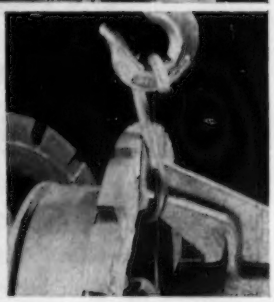
ALLIS-CHALMERS Solids Handling PUMPS

1 Troubles are few and far between

One user of Allis-Chalmers solids handling pumps said, "We've been operating them for 8 months without loss of capacity." . . . another said, "We ran it for 13 months before we replaced the first part."

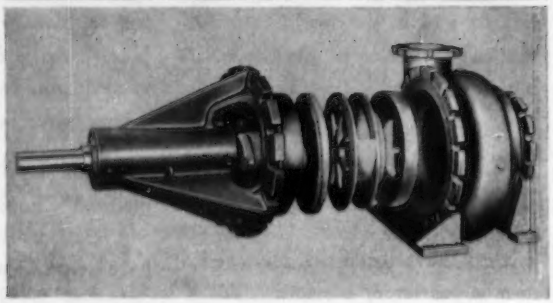
2 Inspection is an easy routine

Take-down and re-assembly require less than half an hour. Merely disconnect the drive . . . loosen the nuts on casing bolts . . . and lift out the bolt assemblies. Then, swing out the rotating element. There's no need to disturb the suction or discharge piping.



3 Parts replacement is fast, economical

Wear is limited because there are only five wearing parts. Many parts are interchangeable among several sizes of Allis-Chalmers solids handling pumps so you won't have to carry big spare parts stocks. What's more, because parts replacement *is* infrequent . . . because it's so fast and simple . . . down-time production interruptions are held to a minimum.



In addition to sound design, Allis-Chalmers solids handling pumps feature special hard alloy *Ni-Hard* and extra thickness of metal in critical spots. Then, too, each A-C pump is application engineered to meet the specific conditions under which it will be used.

Remember, Allis-Chalmers can furnish the complete pumping unit—pump, motor, control and drive. Next time you need a solids handling pump, call your A-C representative or write—Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 52B6381.

A-4603

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

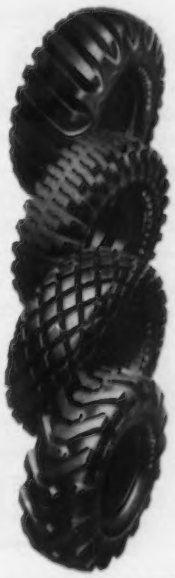
OLD EARTH-MOVING HANDS JOIN HARD-ROCK MEN TO MAKE "UNPROFITABLE" IRON MINE PAY OFF!

The Benson Mines, at Star Lake, deep in New York's Adirondacks, have been worked since pre-Revolutionary days—but working the low-grade, non-magnetic ore by old-time methods wouldn't pay today. Now a 30-unit fleet of 22-cubic-yard trucks, rolling on Goodyear tires, moves mountains to lay the ore body bare. 4-ton drop-balls, with old tires as shock absorbers (as shown above), break blasted rock to crusher size—and ingenious spiral troughs find "pay dirt" by the ton!

Besides stripping overburden of earth, trees and brush, earth-moving hands have endless road-building work—an earmark of open-pit mining.

3-T NYLON
world's most durable tire cord, keeps jobs rolling on Goodyears—

3-T NYLON, made only by Goodyear's *patented* process, can take terrific punishment. Users say bruise-breaks are practically unknown and tire-growth is permanently controlled. 3-T NYLON is also so *heat-resistant* that users say ply-separation, flex-failures and heat-blowouts are virtually eliminated! Combined with Goodyear's new, tougher rubber compounds, 3-T NYLON makes Goodyear tires the toughest, most durable—and saves you plenty with more re-lugs and recaps. Check into this before buying or specifying *any* new tire. Goodyear, Truck Tire Dept., Akron 16, Ohio.



HARD ROCK LUG

ROAD LUG

ALL-WEATHER

SURE-GRIP

Road Lug, All-Weather, Sure-Grip—T. M.'s
The Goodyear Tire & Rubber Company, Akron, Ohio

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE BUILT WITH 3-T NYLON CORD!

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Blacksmith Billy Watkins shanking a Crucible Hollow Drill Rod.

they're using Crucible Hollow Drill Rods on the Boston Tunnel Jobs . . .

400-feet below the city of Boston, two seven-mile tunnels are being cut through solid rock. Replacing century-old mains, the tunnels will bring water from Quabbin Reservoir, 70 miles away, and remove drainage from the city.

On this job, like most other tough ones, Crucible Hollow Drill Rods are in daily use. For experienced construction men *know* they can depend upon Crucible Hollow Drill Rods for top performance at *lowest cost per foot of hole drilled.*

That's because they are made to *tool steel* standards by the nation's leading producer of *special steels.* So for *extra* dependability on *all* your drilling jobs specify Crucible Hollow Drill Rods. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

120-foot-high head frame used to raise and lower men and materials in excavation shaft. Morrison-Knudsen-Kiewit-Maney City Tunnel Extension Job, Boston, Mass.

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

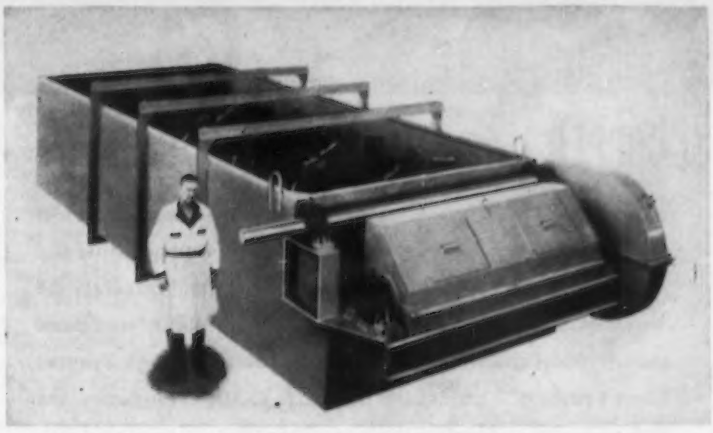
E&MJ NEW PRODUCTS DIGEST

TRACTOR JUMBO

Here's a drilling rig that provides mine and quarry operators with a completely self-contained mobile unit. The complete outfit consists of Gardner-Denver rock drills on long feed mountings, hydraulic booms, and a complete air compressor for powering the drills, all mounted on a Caterpillar D-8 tractor. Gardner-Denver compressor assemblies are available in capacities of 600 cfm, 500 cfm, 365 cfm and 315 cfm for direct connection to the rear power take-off of D-8 tractors. Hydraulic booms come in various lengths. Gardner-Denver Co., Quincy, Ill. **(1)**

LOG WASHER

King-size log washer has been introduced by Eagle Iron Works, Des Moines, Iowa. Diameter of the log, which is the shaft and paddles, is 48 in. Tub width is 9 ft 4 in. and tub length is 30 ft. While capacity depends largely on size of material to be washed and amount of foreign matter to be removed, the unit is rated at 150 tph. Unit is powered by 150 hp electric motor through an enclosed reduction unit. Drive end is shown in illustration; feed end is in left background. Paddles have replaceable shoes of Ni-Hard, nickel-chromium-iron alloy. Unit can handle material up to 8 in. in diameter. **(2)**

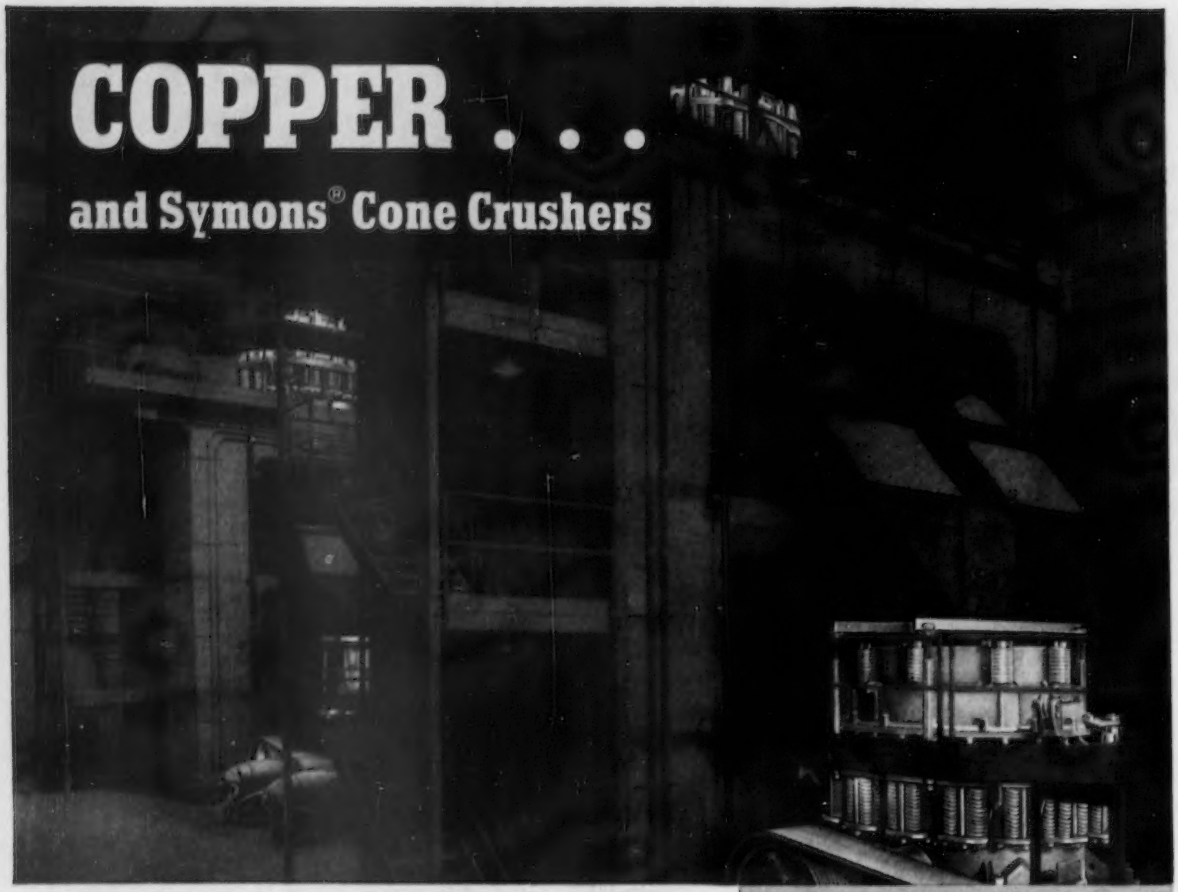


ROTARY DRILL

A new and improved model of its M-8A heavy-duty rotary drill, is announced by Davey Compressor Co., Kent, Ohio. Drill utilizes both compressed air and high pressure water for drilling. It has a rated capacity of 6¼ in. holes up to 300 ft with air and 1,000 ft with mud. Compressor for "air blast" drilling is a Davey 500 cfm unit. High pressure water pump is heavy duty duplex type. Compressor and pump are driven by a GMC-471 engine mounted on the truck bed. **(3)**

COPPER . . .

and Symons® Cone Crushers

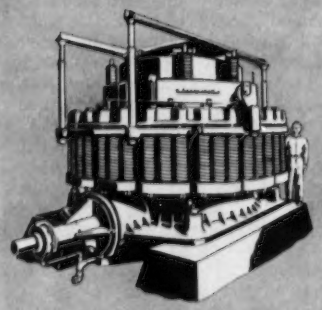


COPPER...and Symons® Cone Crushers

Symons Cone Crushers . . . the *machines that revolutionized crusher practice . . .* have long proved their efficiency, dependability and economy in the profitable reduction of ores and minerals the world over. In the case of COPPER, it is significant that more than 90% of the world's production passes through Symons Cone Crushers. Throughout the entire COPPER industry, the new and repeat orders for these crushers are continued evidence of the satisfaction given in fine reduction crushing service. The outstanding performance of Symons Cones in delivering a finely crushed product in greater capacities and at lower cost makes them the leading choice of the world s outstanding mining companies.

NORDBERG MFG. CO., Milwaukee, Wisconsin

C554-R



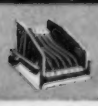
Symons Cone Crushers are built in Standard, Short-head and Intermediate types with crushing heads from 22″ to 7′ in diameter — in capacities from 6 to 900 tons per hour.

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.

SYMONS PRIMARY CRUSHERS

GRINDING MILLS

MINE HOISTS



SYMONS VIBRATING GRIZZLIES and SCREENS

DIESEL ENGINES

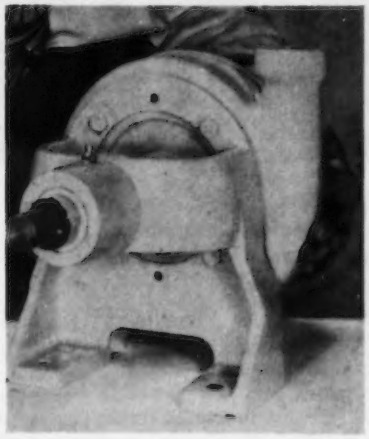
NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

DRYER

A relatively high capacity, compact rotating drum dryer is produced by Roberts & Schaefer Co., Chicago, Ill., for drying or heating granular crystalline materials in steel and by-product processing industries. Dryer requires a floor area of only 3 ft x 5½ ft with an overall height of 6 ft and the location of the surge-feed hopper above the drum permits the hot gases from fuel combustion inside the drum to flow against the incoming material in the surge hopper and thus increase preheating efficiency. It may be operated on either Bunker oil or gas. **(4)**



PUMPS

Camac Cast Steel centrifugal pumps for handling alkaline solutions such as cyanide and caustic and acids such as chromic, provide heads of from 10 to 150 ft with flows from 10 to 200 gpm. Seal is either Camac Special Acid or Teflon and can be water-cooled or not. Performance curves, prints, and prices are available. Carl Buck & Associates, Essex Fells, N. J. **(5)**

BULLDOZER

Eimco Corp. announces that its 105 tractor is now available for bulldozer, winch or other attachments. The tractor design features include: Unidrive transmission which provides for gear shifting under full power in motion, and instant reversals, while eliminating the need for steering with the clutches; and clutches that never need adjustment, with complete elimination of the master clutch. Independent track control through dual final drives is provided so that one track may run forward while the other runs in reverse for true spin turns. Fingertip control, using only two small levers controls all the motions of the tractor. Maneuverability is provided by independent track control. **(6)**

STOPER

Copco Eastern, Paterson, N. J., offers the new "Falcon" auto-feed rotary stoper for overhead drilling. Manufacturer is Atlas-Diesel, Stockholm. Design improvements include elimination of the anvil block used in conventional designs, to reduce overall length and make it easy to handle in confined positions. Air consumed in the block has been utilized to increase piston impact. Rotation chuck has been provided with a snugfitting bushing. Scavenger air, blown through ports surrounding the chuck, sets up a protective pressure cone around the steel to prevent the working parts from fouling. It is provided with feeds accommodating 24 and 30-in. steel changes and has an overall length of respectively 86¾ and 101¾ in. with the feed extended. Weight, including feed, is 77 lb for the 24 in. steel change and 80½ lb with the other. **(7)**

TRACTOR SHOVEL

A new, more powerful 2 yd model HD-9G tractor shovel has been announced by Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. The HD-9G produces 100 net hp and 82 drawbar hp; simultaneously handles maximum traction and hydraulic pump power requirements. **(8)**

TIP BACK BUCKET

A bucket with as much as 25 deg of tip-back at ground level is announced by Tractomotive Corp., for its TL-12 Tracto-Loader. This change in the one cubic yard loader affords easier and faster loading and larger loads. After getting into the pile, the operator can scoop or jockey a load into the bucket by operating the tip-back control lever. This is especially useful in small piles of material where the tendency of standard buckets is to push instead of load. **(9)**

PORTABLE MIXED-BED DEMINERALIZER

For the production of small quantities of pure water, a compact, portable unit, the Model MBD-6A demineralizer, has been developed by Permutit Co., New York, N. Y. The device contains a bed consisting of an intimate mixture of Permutit Q, a cation exchanger and Permutit S, a highly-basic anion exchanger, and it is used to produce a water of low total dissolved solids, low CO_2, low silica content and low conductivity. Flow rate is 1 to 2 gpm maximum. **(10)**

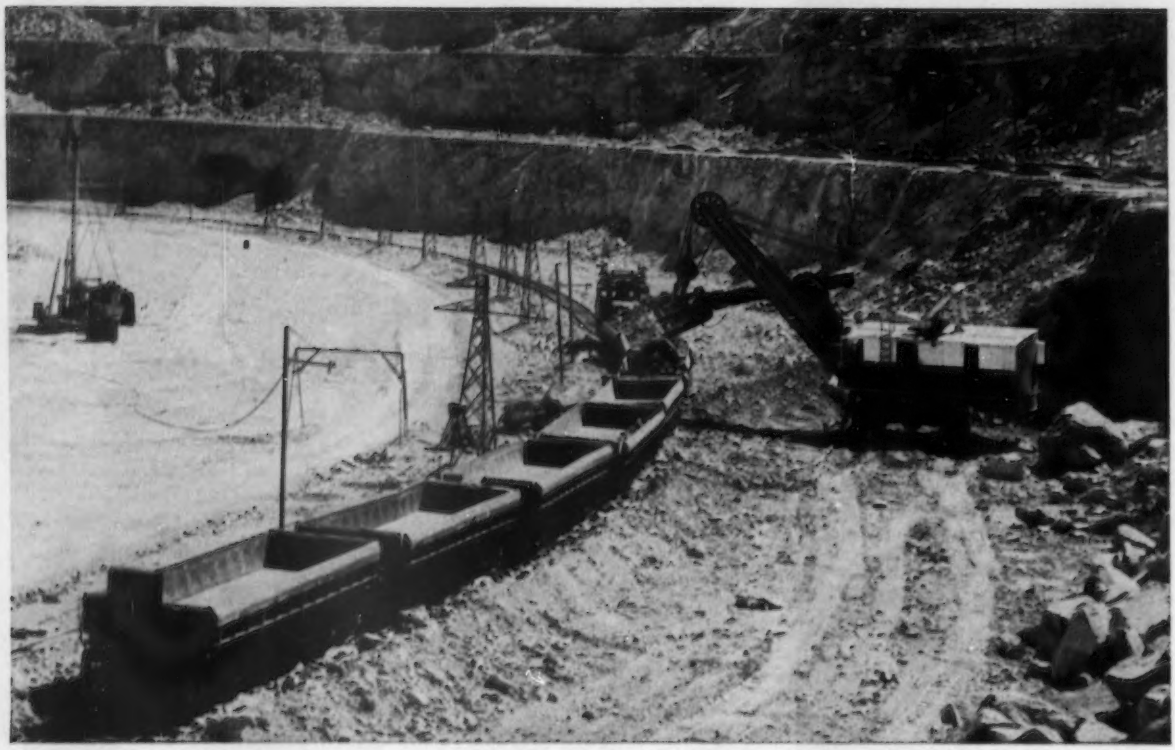
GEIGER COUNTERS

Complete new line of uranium prospecting instruments, including geiger counters and scintillation counters has been announced by El-Tronics, Inc., Philadelphia, Pa. Prices range from $21.95 for a pocket-size geiger counter up to $999.95 for the Master scintillation counter. **(11)**

Where parts must be

EXTRA TOUGH

specify AMSCO® MANGANESE STEEL



Digging! Crushing! Handling! Amsco manganese steel parts work up to 10 times longer under punishment . . . because manganese steel can easily absorb heavy impact and abrasion. Hard work toughens the metal . . . it work hardens to as high as 550 Brinell. The pounding, grating action of rock and ore only polishes manganese steel.

To get maximum life out of your equipment, specify Amsco manganese steel parts from the manufacturer.

DIGGING

dippers and parts
repointers
dragline buckets and parts
dragline chain
sheaves
pinions
crawler shoes

CRUSHING

concaves
mantles
jaw plates
mill liners
hammers

HANDLING

bulldozer blades
tractor rollers, idlers
sprockets, grouser bars
truck beds
grizzle parts
ore car wheels and liners
sheaves, gears, pinions

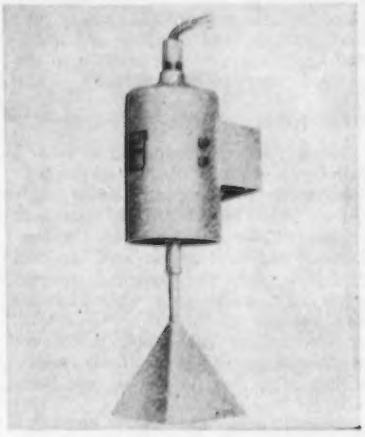
Amsco also produces other alloy steels with maximum wear resistance under particular conditions of service.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

CRANE CONTROL

Modern "Speed-o-Matic" controls are available for the first time on heavy-duty, ¾-yd machines with the introduction of the LS-88 shovel-crane by the Link-Belt Speeder Corp., Cedar Rapids, Iowa. All load handling and machine movements are smooth, safe, fast and precise, according to the manufacturer. Movement of short-throw levers meters pressure for full control of power for all machine functions, for extra speed and to minimize end-of-shift operator letdown. Statistics show that this can increase production up to 25%. **(12)**



BIN LEVEL CONTROL

An improved heavy duty "Tellevel" bin level control is now being marketed by Stephens-Adamson Mfg. Co., Aurora, Ill. Major changes involve a redesign of switch housing and deflector mechanism to further reduce any possibility of sticky material building up on the unit. The pendant steel cone deflector has been replaced by a steel pyramid. The switch housing is now a one piece unit. **(13)**

POWER UNIT

Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis., has redesigned its W-226 heavy duty power unit with a resulting increase in maximum brake horsepower and performance. The new unit when operating on gasoline will develop a maximum 60 bhp at 1800 rpm and 50.6 bhp at 1400 rpm.

In addition to the choice of factory installed gasoline, distillate or natural gas fuel equipment that has been available for the W-226 in the past, the new power unit now also offers factory installed LPG fuel equipment. **(14)**

TRANSIT

Polara, designed to fill the needs of contractors and engineers for an accurate, moderate-priced surveying instrument, has been added to the line of precision engineering instruments manufactured by C. L. Berger & Sons, Inc., Boston, Mass. Has a 10½ in., 22-power erecting-internal focusing telescope with coated optics of new design, providing exceptional brilliance, flatness of field, and resolving power. Reticle has stadia lines at a fixed ratio of 1:100. Bronze standards are double-reinforced "A" type with bronze bearings. The 5½ in. horizontal circle with double opposite verniers and 5-in. vertical circle with one double vernier are of corrosion-resistant aluminum alloy and are graduated to read to one minute. Other features include an accurately ground telescope level vial with sensitivity of 30 sec per 2 mm graduation and two plate levels of 70 sec sensitivity per 2 mm. graduation. **(15)**

SCREEN

Simplicity Engineering Co., Durand, Mich., announces that its W-deck screen is now available on all Simplicity gyrating screens. Permits a more even flow of material across the screen surface. This results in more screening area, better screening, and increased screen life. Maximum opening is 2 in. with maximum wire size ⅜ in. **(16)**

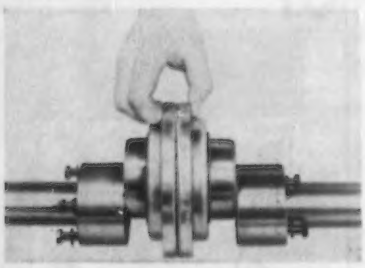
Super Scale
for
Conveyors
Builders Conveyoflo is unsurpassed for accurate weight-metering of belt conveyor flows. Pneumatic system gives full-range metering with minimum vertical belt deflexion. Compact — no overhead framework or complicated lever arms. For Bulletin 550-H4A, write Builders-Providence, Inc., 391 Harris Avenue, Providence 1, Rhode Island.
BUILDERS-PROVIDENCE
DIVISION OF B-I-F INDUSTRIES, INC.
METERS
FEEDERS
CONTROLS

SEISMIC REFRACTION SYSTEM

Very Low Frequency seismic refraction system with special amplifiers, linear from one to 50 cycles, and unique refraction seismometers with a natural frequency of two cycles per second, has been announced by Houston Technical Laboratories, Houston, Tex. With the new VLF system low frequencies are easily recorded, resulting in wider and deeper probing of subsurface conditions. High system sensitivity also permits the use of much smaller powder charges, reducing surface damage. Well-defined first breaks have been received at five miles from a five pound charge. **(17)**

TANK CAR CONNECTION

By replacing the threaded coupling with Quick-Seal coupling made by Titeflex Co., Springfield, Mass., this hose to tank car connection requires only a few minutes to make instead of a half hour formerly needed. To secure details, use postage free reply card. **(18)**



SPACER TYPE COUPLING

Check the practical design of Type F Steelflex spacer coupling which makes it ideal for use between motors and pumps (where a gap between shafts must be provided to remove impeller shaft assemblies) or on any where a large gap up to 12 in.) cannot be avoided. Steelflex design offers protection against damage from impact loads and shaft misalignment; affords easy connection and disconnection of shafts without disassembling the coupling. Falk Corp., Milwaukee, Wis. **(19)**

AEROSOL DISPENSER FOR LUBRICANT

Spray-Lube, a new type extreme pressure lubricant has been announced by the Pressure Products Co., West Chester, Pa. Makes it possible to spray a superior, heavy duty lubricant on open gears, open chains, valve stems, etc. Spray-Lube can be used in temperatures too high for normal grease or oil, and will not drip or throw off running gears. Its effortless application should encourage proper lubrication. Spray-Lube comes in an unbreakable aerosol dispenser, and sells for $1.25 a can. **(20)**

GIANT LOADER

Development of a huge front end loader weighing 47,820 lb has been announced by Mixermobile Manufacturers, Portland, Oreg. Equipped with a 10 cu yd bucket, the LD20, the giant machine was designed for large scale handling of relatively light materials. Also available is a 4 cu yd bucket for conventional loading tasks. Lifting capacity of the boom is approximately 18,000 lb. Bucket discharge height is 14 ft. **(21)**

TRANSMISSION BELTS

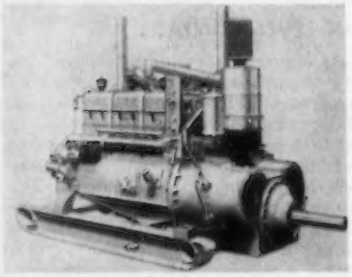
A line of Compass transmission belts is being placed on the market by the Goodyear Tire & Rubber Co., Akron, Ohio. A processing technique for synthetic filaments, called 3-T, stabilizes the wild stretch characteristics of man-made fibers. Addition of patented 3-T cord to the manufacture of transmission belts has given Goodyear a product that is thinner, more flexible and capable of carrying greater loads than its predecessor, thus cutting the cost of belts needed for particular jobs. **(22)**

CYCLONES

Dorr-Oliver, Stamford, Conn., announced the availability of the Type M DorrClone for the wet classification of chemical, metallurgical, and non-metallic pulps in the 8 to 20 micron range. Comprising either 10-50 mm or 20-30 mm rubber cyclones in a common housing, this new DorrClone serves to bridge the gap between the smaller 10 and 15 mm. Type TM DorrClone and the standard 3 in. unit. The individual cyclones operate in parallel from a common feed chamber, and overflow and underflow products are combined and discharged from common outlets. **(23)**

DEEP HOLE DRILL

Deep hole percussion drill with a hammer diameter of 4½ in. has just been announced by Gardner-Denver Co., Quincy, Ill. Model SFH123 has been engineered for use with the Gardner-Denver ring seal shank and sectional drill rods. It is mounted on a compact screw feed guide shell which handles steel changes up to 8 ft. Provides increased drilling speed and power for handling longer holes on any deep hole drilling project, or for drilling long holes of larger diameter. **(24)**



POWER UNIT

High horsepower in the range from 252 to 290 is provided in the new, heavy-duty 1600-12A industrial power unit made by Minneapolis-Moline Co., Minneapolis, Minn. Unit operates with 12 v on either natural or LP gas. Dual six-cylinder engines of the MM 800-6A class, mounted in parallel, are geared to a single power takeoff shaft. Displacement is 1600 cu in. **(25)**

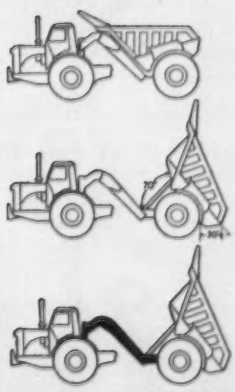
Four TR-200's work up to 460 hours a month . . . average only 4 hours down time

In less than a year, the George W. Kerford Quarry Company, Atchison, Kansas, put 3,828 hours of work time on each of their four Allis-Chalmers TR-200 Rock Wagons. They piled up 460 hours a month over one five-month period. During the year, service down time for each unit averaged only 4 hours a month . . . this means that each rock wagon was on the job over 98 percent of working time!

The TR-200's have been hauling quarry stone from the pit to a crushing plant 1½ miles away. Loads average 16 tons and each cycle is completed in 14 min. Fuel consumption has been about 3¼ gal per hour with no oil needed between changes.

George E. Kerford states, "We like the TR's maneuverability and easy control, which makes it possible for any good truck driver to learn to drive the outfit quickly. The wagon body is well constructed and cleans easily and completely. We find that most parts needing frequent maintenance and repair are easily accessible."

HERE ARE THE FEATURES BEHIND THIS OUTSTANDING RECORD



Big bowl top makes excellent target for shovel or dragline operator, helps loading under bins or chutes.

High power-to-load ratio of 16 hp per yard of capacity speeds hauling, helps on steep grades.

Maximum lift angle of 70 degrees speeds dumping of any type material. Big opening and "bathtub" design slide loads out fast at minimum dump angles.

Dumps 30 in. back of rear wheels to put entire load over banks or into hoppers.

Wheel base stays fixed during dumping cycle for greater safety on banks, accuracy in spotting loads.

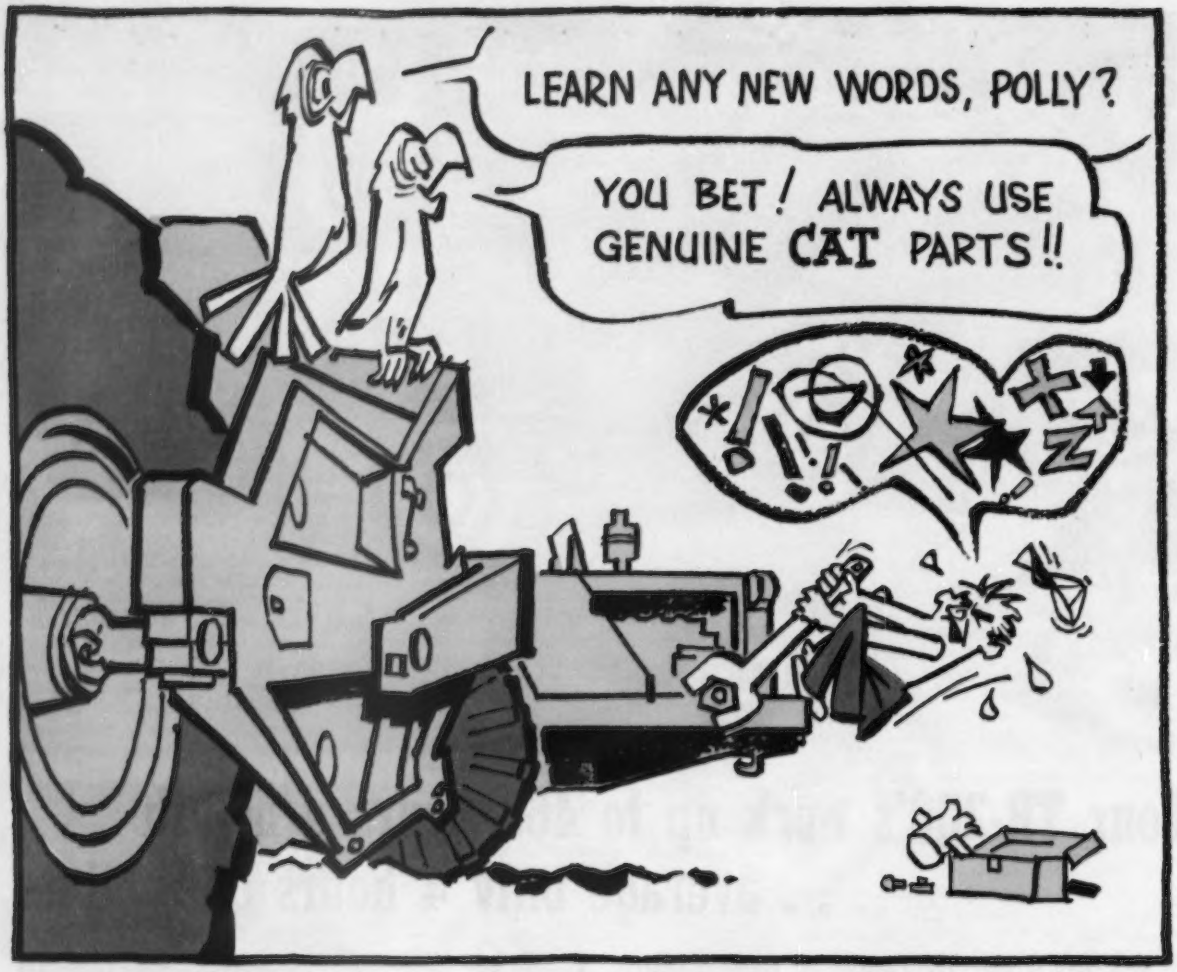
Four-wheel air brakes allow full control, safer dumping over banks.

Hydraulic control system raises or lowers bowl while traveling, gets TR-200 into position sooner.

176 hp engine — 5 speeds forward to 21.6 mph, reverse 2.5 — 11 yd struck, 15 yd heaped, 18 tons

Write for complete catalogs or ask your Allis-Chalmers dealer for a demonstration

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



Down time sure brings out the classiest words in a man's vocabulary. Best way to avoid it is to insist on genuine CAT* parts every time. Then you're sure of getting parts that are made to the latest design, precisely manufactured of the right materials, rigidly inspected and tested.

Take the parts in the engine's heat zone, for example.

Different makes of liners, pistons and rings look a lot alike. But Cat cylinder liners are "wet type" design, made of hardened alloy iron with inner surfaces "Hi-Electro" hardened. Genuine Cat pistons are made of one-piece aluminum alloy castings, with a cast-iron band bonded into the top to form the hard-service top ring groove. And that top ring—if it's genuine Caterpillar—is heavily chrome-faced. Each Cat ring is individually cast from specially alloyed iron. With substitute parts: who can be sure?

The difference on the job: Caterpillar-built parts in your engine's heat zone give you new-machine performance, shorter break-in time, longer life and the true economy of reduced repair costs and uninterrupted production. With substitute parts: who can be sure?

Better get genuine Caterpillar parts every time.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

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For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

REAGENTS. Palcotan and Palconate are a couple of good dispersing agents that double as depressants for calcite in flotation of fluorspar or scheelite. Pacific Lumber Co., San Francisco, Calif., furnishes a brochure with all the vital information on these dispersants. **(51)**

BOTTOM DUMP. The 17 yd Bottom-Dump catalog, No. 251, provides detailed information on a unit which features an excellent horsepower to weight ratio. It is interchangeable with 15.5 cu yd Euclid scrapers, giving the user flexibility. Unit hauls loads of 20 cu yd heaped at 3:1 slope and 25.5 cu yd heaped at 1:1 slope, at speeds up to 28.2 mph. Euclid Div., General Motors Corp., Cleveland, Ohio. **(52)**

DRAGLINE BUCKET REPLACEMENT PARTS. Replacement parts for any make or model of dragline bucket are described in a new catalog just released by Electric Steel Foundry Co. of Portland, Ore. Useful information includes how to determine proper drag chain length; drag and hoist chain specifications; maintenance tips and alloy recommendations. Also included is information on several new products such as the Esco "Spring Lock" hinge repair links for drag chains. The 28-page catalog is indexed and tabbed for speedy reference. **(53)**

VARIABLE SPEED DRIVE. Schematic drawings, dimensions, specifications plus a dissertation on the advantages of Nelson Power Mate variable speed liquid drive, are all contained in this bulletin from Liquid Drive Corp., Holly, Mich. **(54)**

COMPRESSOR. A 4-page bulletin illustrates and describes many exclusive features found on the 85 cfm Airmaster. A cross section view of the one unit engine-compressor design, shows how the single cooling system, one lubrication system, and one crankcase and crankshaft simplify maintenance. Specifications are given for the compressor and engine. Tool capacities are included as well as weights and dimensions for skid and wheel mounted units. LeRoi division, Westinghouse Air Brake Co., Milwaukee, Wis. **(55)**

VALVE SELECTION. A 20-page, two-color, profusely illustrated pamphlet titled, "Choosing the Right Valve," has been issued by Crane Co., Chicago, Ill., to serve as a handy refresher in basic valve designs. It puts at the piping engineer's elbow, a great variety of valve types from which he may choose the right one to provide dependable and economical performance in the proper service. **(56)**

BELT CONVEYOR. Stephens-Adamson Mfg. Co., Aurora, Ill., now offers a complete set of belt conveyor components pre-engineered for customer assembly. Units are designed for lengths up to 50 ft and for 51 ft through 100 ft in both 18- and 24-in. belt widths. Limiting capacity for 18 in. belts is 150 tons per hour and for 24-in. belts, 250 tons per hour. Bulletin 1454 contains the answers to your questions. **(57)**

TRUSSLESS BUILDING. An inexpensive, revolutionary, all-steel building, developed on a patented, trussless construction principle, which several persons can erect in only hours without special tools can be produced in a variety of sizes from 30 ft wide and 14 ft high to 100 ft wide and 35 ft high. Read all about it in this bulletin from Wonder Building Corp., Chicago, Ill. **(58)**

SPLICING CABLE. Important instructions for splicing and terminating shielded Anhydrex rubber-jacketed cable (2,001 to 17,000 v, phase to phase) are spelled out in this very valuable piece of literature for present or future users of Anhydrex cable made by Simplex Wire & Cable Co., Cambridge, Mass. **(59)**

PUMP TROUBLE. Extremely informative is this 4-page deal on locating troubles in pumps. No fuss, no double talk, just a straight digest of where to look for the cause of any kind of trouble you may have with rotary, centrifugal, steam and regenerative turbine pumps. Worthington Corp., Harrison, N. J. **(60)**

DUSTLESS ROOF BOLTING. The Dryductor for putting on roof bolts, cannot release dust while it is drilling and cannot drill unless dust is being removed. This folder from Goodman Mfg. Co., Chicago, Ill., tells you all about it. **(61)**

FILTER CLOTH. Circling No. 62 on the reply card will bring you a useful folder (65A) on the various types of synthetic filter cloths made by Filtration Engineers, Inc., Newark, N. J. Look these over if you are concerned with filtration or dust collection. Don't forget to mail the card. **(62)**

WIRE ROPE ASSEMBLIES. "Macwhyte Safe-Lock Wire Rope Assemblies" is the title of catalog 5201, published by the Macwhyte Co., Kenosha, Wis. These assemblies are a unit of flexible wire rope with permanently attached fittings of various types and sizes to make a complete operating flexible unit. These controls are used as a part of machinery and equipment or for slings and hoists. **(63)**

ENGINEERING IRONS. Bulletin A-60, 28-page basic reference bulletin, compiled primarily for design engineers, presents many valuable characteristics of modern nickel cast irons and illustrates their broad acceptance throughout industry. International Nickel Co., Inc., New York, N. Y. **(64)**

URANIUM PROSPECTING TOOLS. A good catalog of practical tools available for prospecting for and developing uranium orebodies is available from Minerals Engineering Co., Grand Junction, Colo. From Geiger counters to jumbos,

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to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

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MARCH 1955

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1	8	15	22	29	36	43	50	57	64	71	78	85	92
2	9	16	23	30	37	44	51	58	65	72	79	86	93
3	10	17	24	31	38	45	52	59	66	73	80	87	94
4	11	18	25	32	39	46	53	60	67	74	81	88	95
5	12	19	26	33	40	47	54	61	68	75	82	89	96
6	13	20	27	34	41	48	55	62	69	76	83	90	97
7	14	21	28	35	42	49	56	63	70	77	84	91	98

My Name ..... Position .....

Company .....

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it is well sprinkled with helpful information. (65)

DRILL DUST COLLECTOR. Lightweight, completely portable, box type dust collector permits dustless drilling of 4 holes without moving, is low in cost and simple in design. Key points are covered in a 4-page folder from the manufacturer, Browning Dust Collector Co. (66)

EUCLID EARTHMOVING EQUIPMENT. This 50-page book runs the proverbial gamut. If it's earthmoving and Euclid makes it, you'll find it and its specifications in this attractive piece offered by Euclid Div., General Motors Corp., Cleveland, Ohio. (67)

WIRE ROPE SLINGS. From England comes this 20-page booklet, illustrating and describing a wide variety of slings. Contains several useful tables and a few words on the care of slings. British Ropes Ltd., Doncaster, Gt. Britain. (68)

FILTRATION. Porous stainless steel, porous teflon and porous Kel-F, a noncorrodible fluorocarbon, are charted, discussed, illustrated and priced in this remarkable catalog from the Pall Filtration Companies, Glen Cove, N. Y. Includes reprints of technical articles on the subject. (69)

LIFT TRUCK OPERATION. "How to Operate a Lift Truck" is a 24-page, easy-to-read, highly instructive booklet containing everything but everything, that you should know to qualify as a lift truck operator. Hyster Co., Portland, Ore. (70)

REFRACTORIES. "Properties of Super Refractories" is an informative 24-page booklet wherein Carborundum Co., Perth Amboy, N. J., has bound a lot of pertinent data and discussion plus some useful tables on their line of Super Refractories: Carborundum, Carbofrax, Silfrax, Refrax, Alfrax, Mullfrax, Monofrax and Firefrax. (71)

PLUGS AND RECEPTACLES. Bulletin No. B57 describes a new line of attachable electrical plugs and receptacles for mining requirements. Named the "Quik-Loc" series because a ¾ turn couples or uncouples them, they are available for ac or dc applications, from 35 to 450-amp ratings (i.e., No. 8 through 750 MCM, AWG). Factory molded of flame-resistant Neoprene compound and equipped with corrosion-proof couplings or mounting shells, they are watertight, distortion-resistant and shatterproof. Joy Mfg. Co., Pittsburgh, Pa. (72)

DUST COLLECTOR. Bulletin F-2035 describing the Type UFV bin vent filter made by the Ducon Co., Mineola, N. Y. This is a standard, adaptable unit for applications where a hopper, bin or other enclosure should be maintained under a slight vacuum to prevent the escape of product or dust to surrounding atmosphere . . . where the product is not only to be retained in the system but returned to process with no rehandling or complicated transfer methods . . . and where displacement air, either from loading or conveying, must be vented free of dust. (73)

PULLEY MAKING. A pictorial review of American steel pulleys, their manufacturing processes and some of their end uses, has recently been produced in a colorful 16-page brochure by American Pulley Co., Philadelphia, Pa. (74)

SLACKLINES FOR TRACTORS. Owners of tractors equipped with two-drum winches will be interested in Bulletin No. 160. It gives scraper and slackline bucket sizes for tractors from 40 to 150 hp; useful information, if you want to set up a slackline cableway. Maximum spans, line speeds and capacities in cu yds are also shown. The slackline cableway gives owners a long range excavator with very little additional investment. Sauerman Bros., Inc., Bellwood, Ill. (75)

ATLAS-COPCO EQUIPMENT. Copco Pacific, Ltd., San Carlos, Calif., illustrates in a new 12-page booklet its complete line of Atlas-Copco mining equipment. Product coverage ranges from Copco's rock drills to new Atlas all-purpose hoists. Details and photographs are given for the first time of the 13-model series of Atlas compressors, including the NT-9-MV portable with diesel air-cooled motor. (76)

SPUR-GEAR HOIST. An 8-page, two-color bulletin describing the line of spur-gear hoists made by Coffing Hoist Co., Danville, Ill., includes pictures, cutaway drawings, descriptions and specifications of the entire YC and YCT lines, making a total of 62 different sizes and models with capacities from ¼ to 25 tons. (77)

GAS CLEANING. Here's where you find out about a gas washer with a new idea for removal of dust, fumes and mist at high efficiency even in sub-micron ranges. This may be the answer for your air pollution or process dust recovery problems. Contains an interesting chart on range of particle sizes of dust and smoke from various types of industrial plants, and the range of commercial collecting equipment. You ought to send for this. Ventil Corporation, Harrisburg, Pa. (78)

SAFETY EQUIPMENT. A 20-page Safety Equipment Catalog No. 55 has been prepared by the E. D. Bullard Co., San Francisco, Calif. (79)

BLAST HOLE DRILL. A 16-page bulletin (50-R-2) describing Bucyrus-Erie's 50-R blast hole drill is now available. Pictorially illustrated, the booklet offers a complete description of the machine's features along with a list of general specifications. Bucyrus-Erie Co. (80)

P&H PRODUCT PARADE. Picture Bulletin G-15 from Harnischfeger Corp., Milwaukee, Wis., carries a listing of products bearing the familiar "P&H" name. The booklet is streamlined, giving essential facts, capacities on P&H overhead cranes, electric and chain hoists, arc welders, welding electrodes, welding positioners, truck cranes, power shovels, electric shovels, soil stabilizers, diesel engines and also details on P&H prefabricated homes. (81)

HYDRAULIC CYLINDERS. An 8-page, profusely illustrated catalog (54-68) describing "Compact" hydraulic cylinders for general industrial application is now available from Vickers Inc., Detroit, Michigan. (82)

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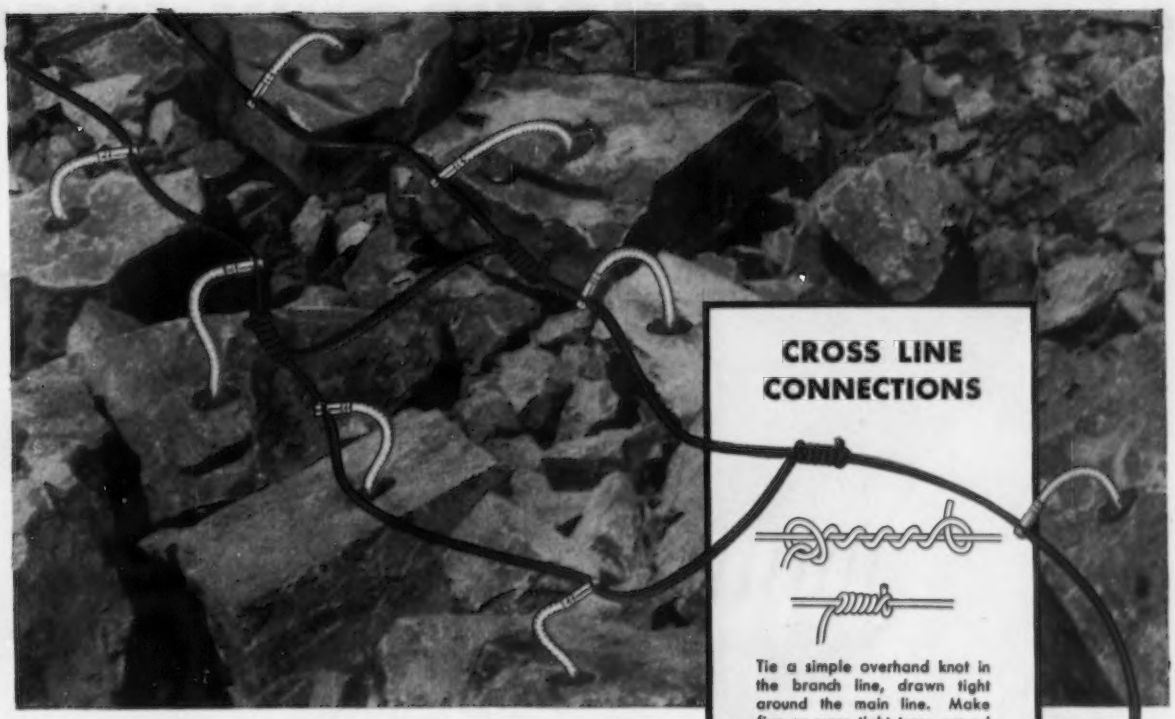


CROSS LINE CONNECTIONS

Tie a simple overhand knot in the branch line, drawn tight around the main line. Make five or more tight turns around the main line and pull end tight through last loop.

MAIN LINE CONNECTIONS

Lay ends parallel and tie them together with two overhand knots, pulled up tight.

In block hole blasting with Safety Fuse, get the fire there — faster with Quarrycord

Big chunks in a rock pile can cover a lot of territory. You'd like to break them up "pop-pop-pop" in one operation. You want to be able to do this safely when it's convenient, even while thunderstorms threaten. And every man must be off the rock pile before the first hole goes!

All this is possible *now*. Use Ensign-Bickford Safety Fuse in each hole, and connect all fuses with *Quarrycord*.

Quarrycord is a flexible, water-resistant cord specially constructed to burn fast. An external flame travels along the Quarrycord at about one foot per second. A connector is crimped on the free end of each fuse and forms a positive connection for the Quarrycord.

It's very important to plan the hook-up so that each safety fuse has burned below the collar of the hole before the first charges fire. You can do this by using cross connections as shown at the right.

See your Explosives Supplier or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Manufacturers of Primacord® Detonating Fuse, Safety Fuse, Ignitacord®, Blasting Accessories.
Established 1836

ENSIGN-BICKFORD

Quarrycord

for lighting Safety Fuse in Secondary Blasting

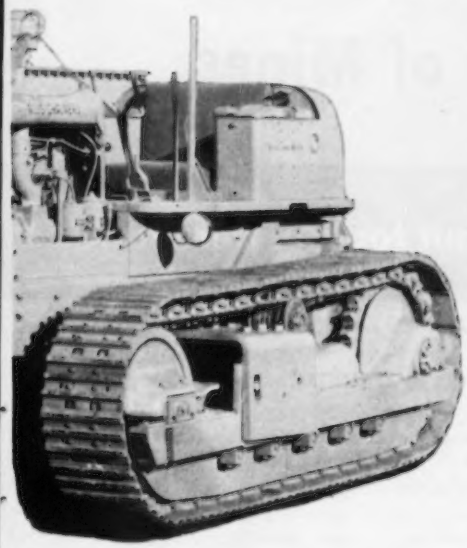
Q-2

SHOWDOWN WITH

NOW IS THE TIME to reconsider old methods and invest in the latest production equipment. Compare the Gismo Method with other methods of mining. Compare initial investment required by conventional equipment and the Gismo equipment. Compare maintenance and operating costs of equipment in conventional methods with the equipment in the Gismo Method. Compare the total overall effect on your operation's efficiency between conventional methods and the Gismo Method. Some companies, who had plans already made for the purchase this year of equipment in conventional methods, have abandoned them in favor of equipment in the Gismo Method. They found upon investigation that the economies offered by the Gismo Method were far greater! That's why we urge you to investigate the Gismo Method.

THE GISMO does not load by momentum or crash-fashion. Shovel head is eased into muck pile (see photo at right) as simply as a hand shovel into sand. The Gismo loads regardless how thick the muck may be.

MINING COSTS: Gismo Method promises big new economies



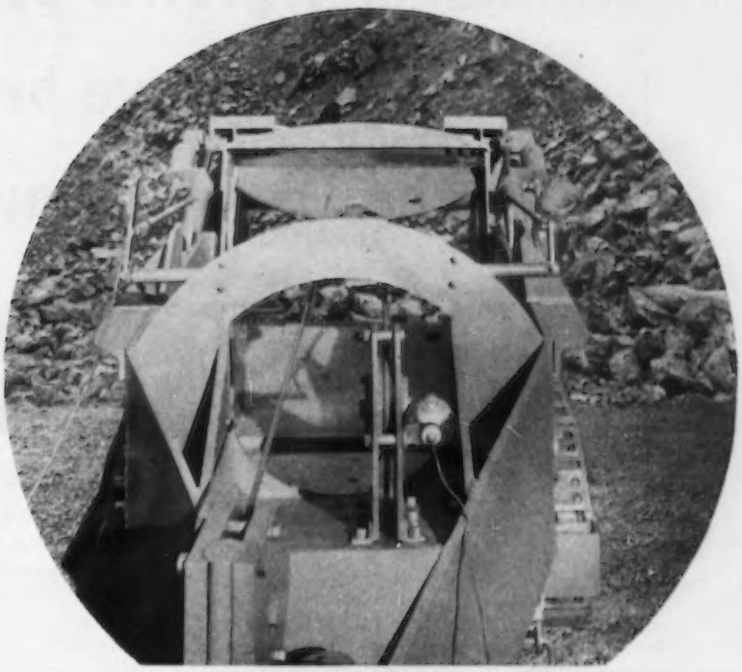


Photo above, taken from operator's seat on tractor, shows how the GISMO is operated under his complete control with clear view of shovel.

THE GISMO MAKES POSSIBLE a mining method requiring few machines, few men, less planning and integration. It permits total mechanization of your mine—the solution to present economic conditions of high man-hour and materials cost.

How does it do it? By offering you a general purpose utility self-loading transport (the GISMO) that is simple, versatile and built to take the punishment of rock excavation. It is well suited to almost all mining conditions. No special development facilities or conditions are usually required. It operates in sloping ore bodies with irregular outlines, as well as large or relatively small openings. It is easily maneuverable at maximum or minimum speed of the equipment.

With perhaps a few exceptions, the GISMO can be taken into any mine . . . disassembled easily and quickly if necessary.

Its versatility meets every requirement. It loads (mucks) in development or production . . . transports . . . drills (supports 2 to 5 jib mounted drills) . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely.

The GISMO is an efficient machine that can load and transport up to 100 tons per hour with a 300 ft. haul . . . drill at rate of 400 ft. per man shift . . . is an extremely simple piece of equipment built for rough work and requiring little maintenance. Its initial cost can be reasonable compared with one year's maintenance cost alone of much of the conventional equipment in present use. Without question, the extraordinary economies the Gismo Method promises merit thorough investigation by any firm excavating rock or its equivalent. Ask us for complete information. *Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.*

Sanford-Day IRON WORKS

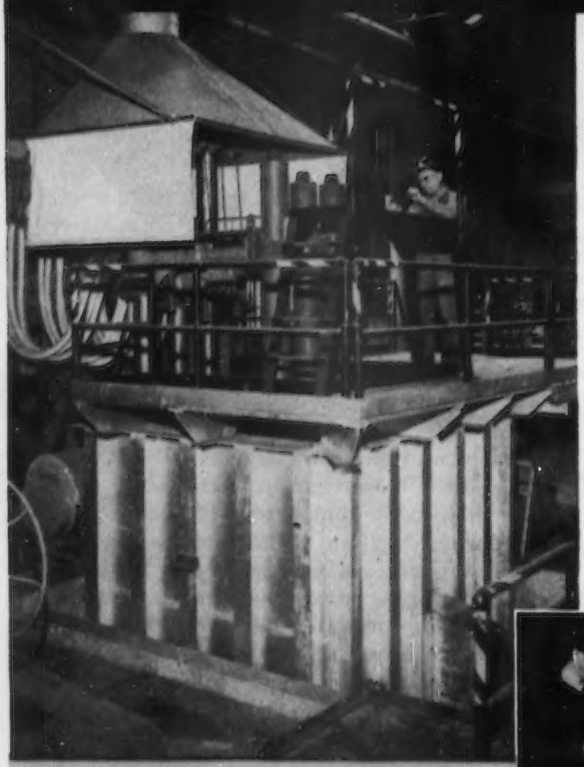
KNOXVILLE • TENNESSEE

AND BROWN-FAYRO DIVISION

MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS
CAR RETARDERS - SPOTTERS
PUMPS - OIL SPRAY SYSTEMS

All industry profits by this research at these five branches of the U. S. Bureau of Mines

Lectromelt furnaces are important tools in this work



BOULDER CITY, NEVADA

In this 500-KVA Lectromelt-equipped furnace, development work started in a smaller Lectromelt-equipped electric furnace is continued. Problems include the evaluation of agglomerated domestic chromite concentrates for production of ferrochrome, and research on production of ferromanganese from off-grade concentrates.

SALT LAKE CITY, UTAH

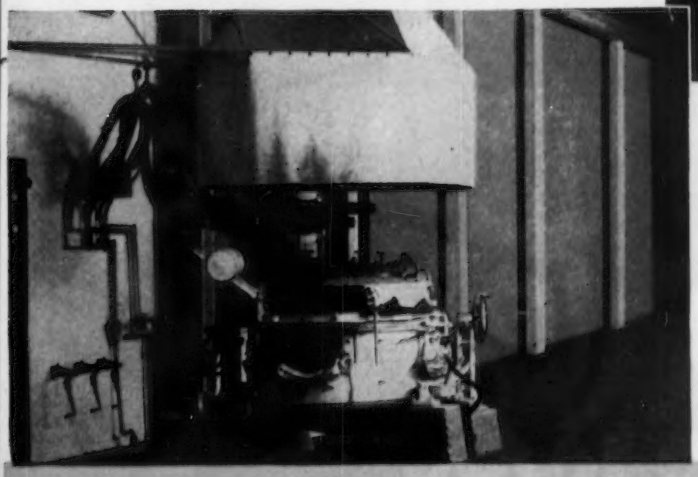
After new ideas have been tested in a smaller Lectromelt Furnace, they are stepped up to a pilot plant basis in this Type U Lectromelt Furnace. Here smelting rates, power and electrode consumption and refractory life can be determined. Problems have involved the smelting of low-grade nickel ores, of titaniferous magnetite ore, manganese concentrates and of rhodonite.

ALBANY, OREGON

A Type W, single-phase Lectromelt Furnace is used for preliminary smelting tests. A Type ST, 3-phase Lectromelt Furnace melts and refines metals and alloys produced in a continuous electric smelting furnace of the Bureau's own design. This picture shows refined cobalt being poured into water to granulate the metal to meet GSA specifications.

ROLLA, MISSOURI

This 100-KW Lectromelt Furnace is used for pyrometallurgical investigations such as these: Processes for separating titanium oxide from ilmenite or rutile ores . . . for separating cobalt, copper and nickel from a complex matte, or as a combined smelter-converter in extracting these metals from a pyrite concentrate . . . in experimental smelting of low-grade iron ores.



PITTSBURGH, PENNSYLVANIA

The Pyrometallurgy Laboratory of the U. S. Bureau of Mines will soon install this Type ST Lectromelt Furnace (originally located at the Bureau's Redding, California Station) to enlarge the Pittsburgh Laboratory's research facilities.

Whatever the status of your smelting processes—still experimental or ready to put into production—there is Lectromelt equipment able to serve you. Our engineers have been conducting research for years on electrothermic reactions. This experience is available to you. For a free copy of Catalog No. 105, write Pittsburgh Lectromelt Furnace Corporation, 322 32nd Street, Pittsburgh 30, Pennsylvania.

*Reg. T. M. U. S. Pat. Off.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

an ACCO product

After years of field testing . . .

AMERICAN CHAIN & CABLE

Announces with Pride

TRU-LAY VHS

Very High Strength Wire Rope

TRU-LAY VHS will soon be the talk of men everywhere who use wire rope on the toughest jobs, as scraper ropes, drag lines, shovel hoist ropes, logging chokers, rotary drilling lines and slusher ropes.

TRU-LAY VHS *has 15% greater tensile strength than rope made of* IPS—*Improved Plow Steel. Up to now* IPS *has been the top standard rope.*

STRONGER AND TOUGHER

On jobs where the strength of wire is the big thing, VHS wins hands down. It's so much stronger that you can safely handle heavier loads with the same diameter rope; or you can use smaller ropes for the same loads.

Along with its greater strength, VHS is a tougher and more wear-resistant rope. It offers greater resistance to abrasion. *This means size for size,* VHS *rope will last longer.*

Stronger and tougher, this new rope reduces replacement time. It increases work output and cuts down the number of feet of rope needed to operate your equipment.

A NEW GRADE OF STEEL

The secret of TRU-LAY VHS rope is a new grade of steel for wire rope and a certain way of processing it. ACCO engineers and researchers have worked on this for years. Now we are confident that it is the greatest improvement in wire rope since we announced Preformed thirty years ago. Those who have used it say it is by far the best rope they've ever used...In short, it combines all the advantages of Preformed with the added strength and toughness of VHS.

Developed for These TOUGH JOBS

SCRAPER ROPES

Small sheaves and drum, cross winding, dirt—all call for VHS with its higher strength, flexibility and resistance to abrasion.

DRAG LINES

Are whipped, jerked, scraped, and dragged in the dirt. But a TRU-LAY VHS drag line will carry on long after other wire ropes are torn to shreds.

SHOVEL HOIST ROPES

Continuous bending and shock loads necessitate VHS, with its high resistance to abrasion and greater strength.

LOGGING CHOKERS

Here VHS's greater strength in a small rope size means easier handling for the setter. Combined with ACCO's DUALOC endings this means the ultimate in choker ropes.

ROTARY DRILLING LINES

Stronger VHS provides additional weight lifting capacity for deeper drilling with the same size rope. And it takes rough handling and abrasion in stride.

SLUSHER ROPES

Are dragged in the dirt and crosswound on small sheaves. Service records show that TRU-LAY VHS lasts longer in this tough service—costs much less to use.

VHS is the Biggest Thing in Wire Rope Since Preformed

TRU-LAY VHS was applied to certain confidential military uses during World War II. Until very recently, military applications have consumed almost all of our available output.

However, since the war a limited quantity has been sold under close control for specific commercial uses. It was tested under the most severe service conditions and it wasn't babied. *The tests proved that it lasted longer and did more work with less shut-down time for replacement.*

These on-the-job tests proved that TRU-LAY VHS reduced service costs below that of Improved Plow Steel wire rope which, up to now, has been the highest standard grade of the wire rope industry.

Now you can get this new and better grade of Preformed wire rope —TRU-LAY VHS—for use on the types of machines illustrated above.

Ask your nearby American Cable distributor about TRU-LAY VHS or write to the nearest American Chain & Cable Company office listed below for brochure DH-489.

ACCO

TRADE MARK

American Cable Division

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

Use USS Lorain Rolled Plate Linings

to reduce mill "downtime" and cut grinding costs

● One of the biggest robbers of your grinding profits is probably "downtime" for repairs and replacements necessitated by plate failure or bolt breakage. You can lessen costly downtime in your mills by using USS Lorain Rolled Plate Linings. These rugged *rolled steel* plates give extra long service compared to ordinary castings. And they are interchangeable . . . heat treating compensates for localized wear. The special-composition, heat-treated bolts are virtually break-proof and last the long life of the plates.

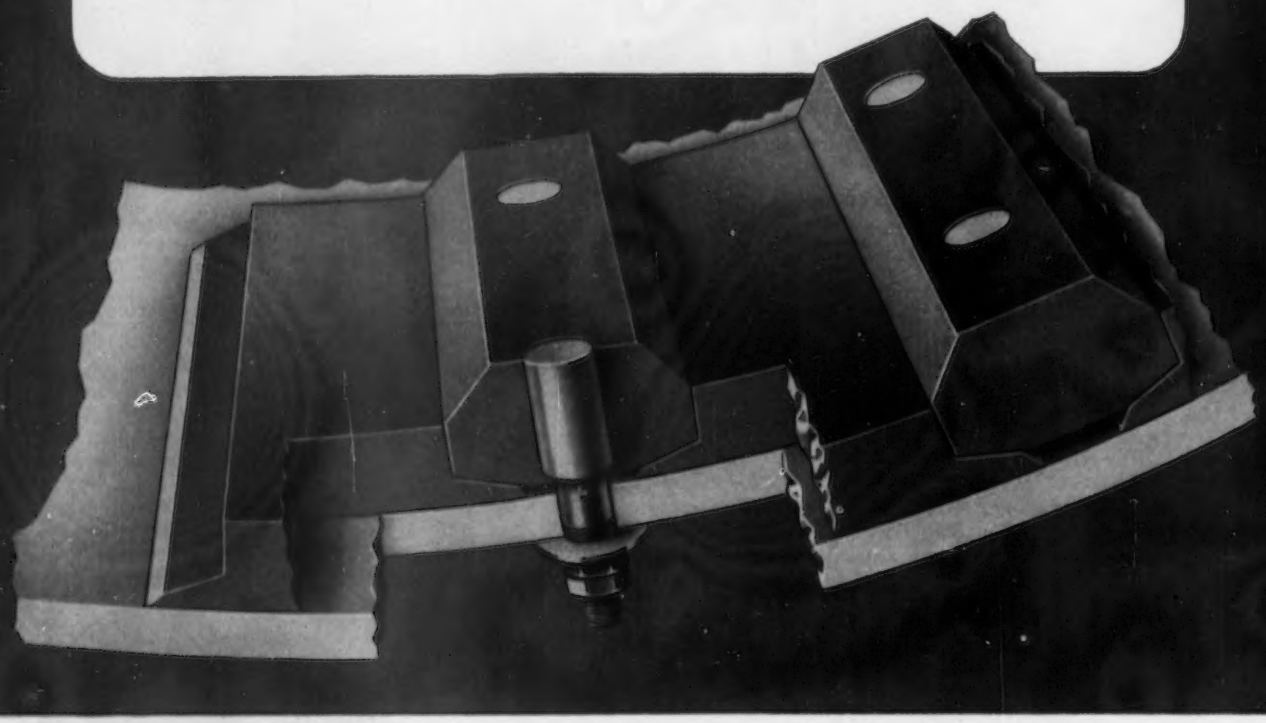
When you use USS Lorain Rolled Plate Linings you get closer tolerances between plates and between plates and lift bars, giving you a tighter overall lining. This means no more shell wash and allied troubles that can ruin the mill itself.

Not only is frequency of replacement reduced with USS Lorain Linings, but the time involved in the actual replacing is less, because these plates are accurately made to size . . . they go in easily, quickly.

Protect your grinding profits. Write to us today for the names of leading mill manufacturers who can supply you with USS Lorain Rolled Plate Linings—for wet or dry grinding.

USS Grinding Balls are designed for economical grinding too. Continual quality checks throughout their production assures you of balls that will take long, rough wear evenly. Sizes from ¾" to 5".

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.



UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS LORAIN ROLLED PLATE LININGS *and* USS GRINDING BALLS

USS

UNITED STATES STEEL

Cyanamid REAGENT NEWS

"ore-dressing ideas you can use"

"with the usual ingenuity of the American workman"

AEROFLOC® 548 Reagent Solves Copper Concentrate Thickening Problem

Reports from Cyanamid Field Engineers frequently combine human-interest notes with ore-dressing data. For instance, this comment on a copper flotation operation:

"They were having trouble with the copper concentrate thickener handling concentrates. It would not settle the tonnage put to it with the result that the thickener overflow coming back to flotation eventually raised the flotation tail seriously."

"A little AEROFLOC 548 solved this problem very easily. Mr. H., mill foreman, with the usual ingenuity of the American workman to do the job with the least effort, added a part of a shovel of AEROFLOC 548 in the mid-morning to the feed well of the copper concentrate thickener. This made a gummy ball of AEROFLOC over which the incoming froth ran for the remainder of the day until it was all in solution. During that time the thickener worked perfectly."

"Not only that, but the capacity of the filter doubled. Actually, it took half the time to filter than before adding AEROFLOC".

Although we usually recommend adding AEROFLOC Reagents as dilute water solutions, this report illustrates a way to do a job with the least effort. It also shows how AEROFLOC 548 accelerates thickening and increases filtration rates. Have you received samples and data on AEROFLOC REAGENTS?

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

Cable Address — Limenitro, New York

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377 Little Collins St., Melbourne C. 1, Australia

Printed in U. S. A.

Heavy fluids can't hinder working parts in these CRANE VALVES

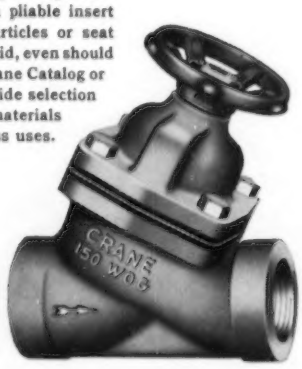
THIS CASE HISTORY tells how the United States Playing Card Co., Cincinnati, solved—with Crane Diaphragm Valves—a costly problem of piping heavy enamels for paper coating.

The trouble was in the plug cocks and conventional gate valves formerly used in the enamel lines. During normal shutdowns the heavy liquid would build up on seating surfaces, in stem threads and working parts. The cocks and gates would "freeze up" . . . were hard to operate . . . couldn't be shut tight. The condition hampered production . . . made floors messy and dangerous . . . pushed maintenance costs sky-high.

Replacing with Crane Packless Diaphragm Valves stopped the trouble completely. Their sealed-to-fluid bonnet and pliable neoprene disc insert did the trick. After more than 4 years, all 48 Crane valves installed—with no maintenance whatsoever—are still seating tight . . . still operating freely and smoothly.

CRANE PACKLESS DIAPHRAGM VALVES

Working parts are safely out of contact with line fluid. The diaphragm seals the bonnet—that's all it does, giving it longer life. The independent disc with pliable insert seats tightly on foreign particles or seat deposits . . . and controls fluid, even should diaphragm fail. See your Crane Catalog or Crane Representative for wide selection of body, bonnet, and trim materials in these valves for countless uses.



CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
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TRUCO CONCAVE BLAST HOLE BIT

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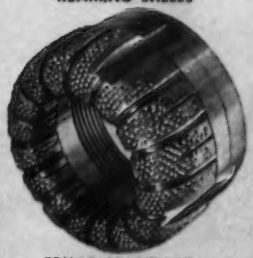
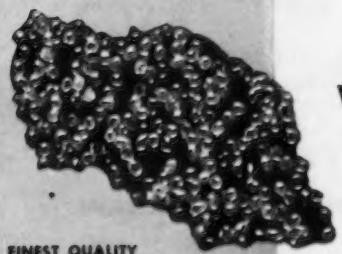


TRUCO STANDARD OIL FIELD BIT



FINEST QUALITY DRILL BORTZ

A Mountain of Light, and a Star

When the royal crown is placed upon a British monarch's head, the soft lights of Westminster Abbey dance upon some of the most beautiful jewels in existence, including two of the world's greatest diamonds—the Koh-i-noor and the Great Star of Africa.

The Koh-i-noor, or "Mountain of Light," was found four thousand years ago in the legendary diamond fields of the King of Golconda. War, conquest, torture, theft, assassination and barter brought it to princes, moguls, shahs and rajahs, and brought tragedy, too, so the legend says, except when it was worn by a woman. Originally it weighed 800 carats, but cutting has reduced it to 106½ and greatly increased its beauty. It adorns the front of the Queen's crown.

The Great Star of Africa, set into the top of the royal scepter, weighs 516½ carats and is the largest cut diamond in the world. The original stone weighed 3,025 carats (about a pound and a half) and although it was the largest diamond ever found, was, obviously, but part of a much larger stone, still undiscovered.

The Great Star came from Premier Mine No. 2 in South Africa which produces many of the fine diamonds used in Truco Diamond Bits. Positioned with "cutting edge to the work," these diamonds give Truco Diamond Bits their irresistible cutting power; their ability to penetrate any formation, swiftly, accurately, thriftily, dependably, lowering rig time and cutting footage costs. May we send you the Truco Diamond Bit Catalog?

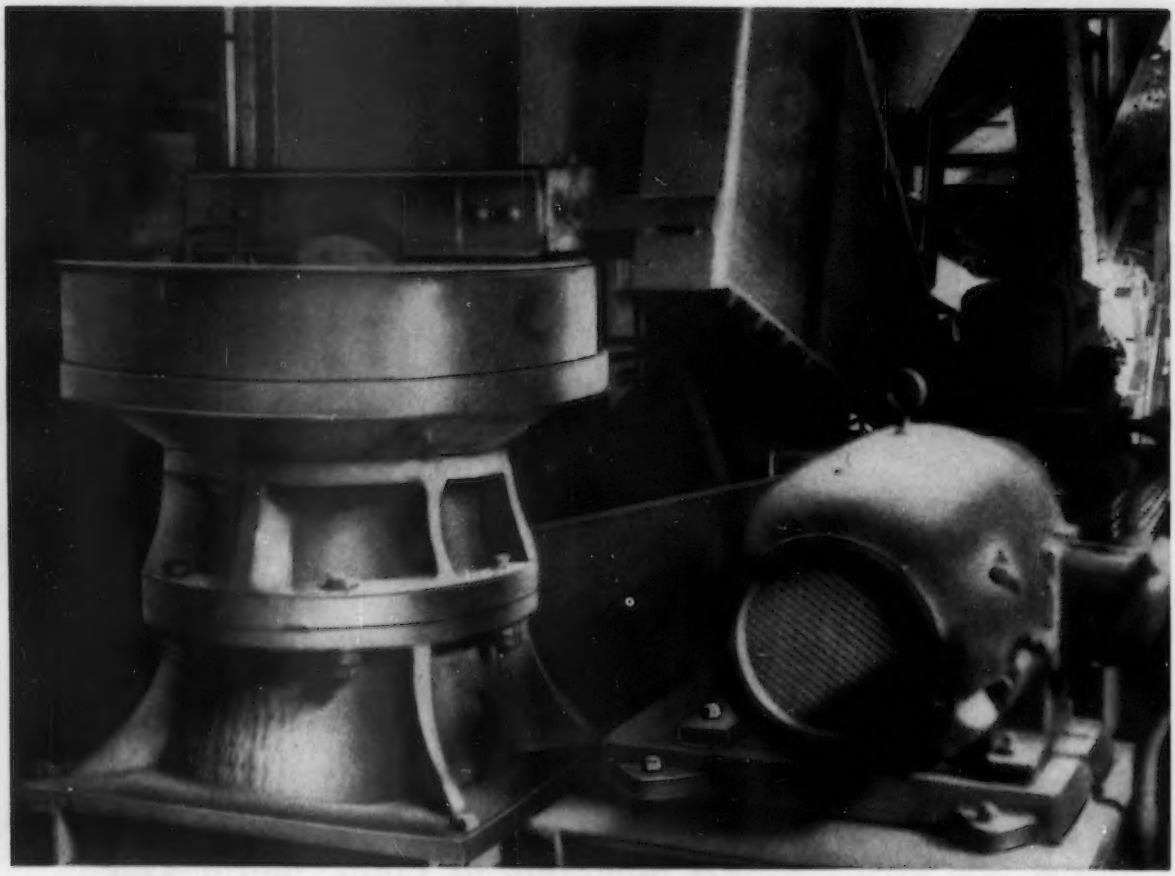
TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada



It Pays to Put Secondary Reduction First

Secondary crushers should receive prime consideration when setting up new ore processing plants.

In many ways, secondary crushing is more important to profitable ore production than the primary reduction of the raw material. A uniform, cubical size product from the secondary crusher assures more efficient processing throughout the remaining stages of ore refinement.

Traylor TY Crushers offer the uniform production provided by Traylor's original curved crushing surfaces. Curved concaves and bell heads, developed by Traylor to meet rugged production requirements, have been proved in hundreds of installations.

They are fully described in Traylor Bulletin #7112. Write for your copy today and see why a "Traylor-Made" secondary crusher is of primary importance to profitable ore production.

TRAYLOR ENGINEERING & MFG. CO.
742 Mill St., Allentown, Pa.
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A Traylor leads to greater profits

SEND FOR BULLETINS
. . . just mention the Traylor Equipment that interests you.

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FINEST QUALITY
DRILL BORTZ

B.F.Goodrich

"We prefer the Universal tread over any other," mine superintendent says

HOUR after hour, Roy J. Ault, superintendent of the Shasta Coal Corporation strip mine at Bicknell, Ind., sees giant tractor-trailers haul 32-ton loads of coal up out of the mine. B. F. Goodrich Universal tires work so well on rock-covered roads that Ault says they are preferred over other makes.

The Universal tread is specially compounded to resist rock cuts and bruises. Wedge-shaped cleats defy dangerous skidding and sliding.

All-Nylon cord body

B. F. Goodrich Universal tires have an *all-nylon* cord body. Nylon is stronger than ordinary cord materials, withstands double the impact. All-nylon Universal tires outwear the tread, *can still be recapped over and over!*

Under the tread is the B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together under impact to protect the tire body. Result: Universal tires wear longer; more tires can be recapped.

See all-nylon Universal tires (size 12.00 and larger—smaller sizes in rayon or nylon) at your B. F. Goodrich retailer's. The address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Co., Tire & Equipment Division, Akron 18, Ohio.*

Specify B. F. Goodrich tires when ordering new equipment

EN ROUTE TO THE TIPPLE B. F. Goodrich tires "hold the road better", Shasta Coal Corp. reports.

UNIVERSAL TIRES are non-directional, can be mounted in any wheel position. You need fewer spares.

NEW "KING-SIZE" CARTRIDGES SAVE TIME AND LABOR

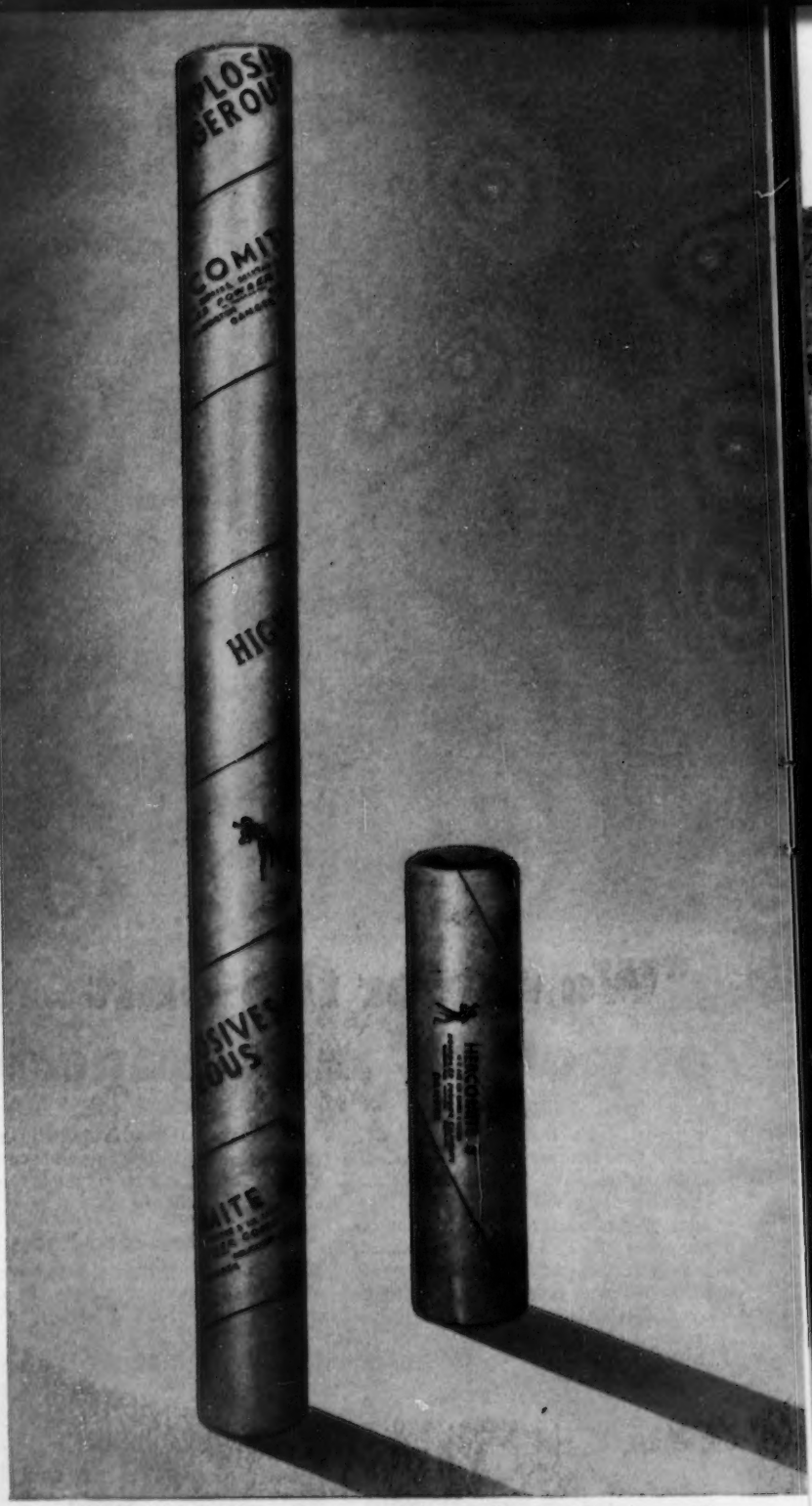
Now, Hercules produces "King-Size" cartridges in lengths of 24, 20, 16 and 12 inches, and in diameters of 1¼, 1½, 1¾, and 2 inches.

Available in all types of Hercules® dynamite, these long-length, small-diameter cartridges are now in full production.

"King-Size" cartridges make possible a more uniform fragmentation through the discharge of a single column of explosive. Their use means substantial savings in valuable time and labor in loading holes.

Hercules designed, tested, and installed special new packing machines for these "King-Size" cartridges.

Our technical service and sales representatives will be glad to discuss with you how these "King-Size" cartridges can go to work for you.



THREE TIMES AS LONG ... Here is one of the new "King-Size" Hercules cartridges—24 inches in length, shown alongside the same grade in the conventional 8 inch size.

HERCULES

HERCULES POWDER COMPANY

INCORPORATED

Explosives Department, 933 King St., Wilmington, Del.

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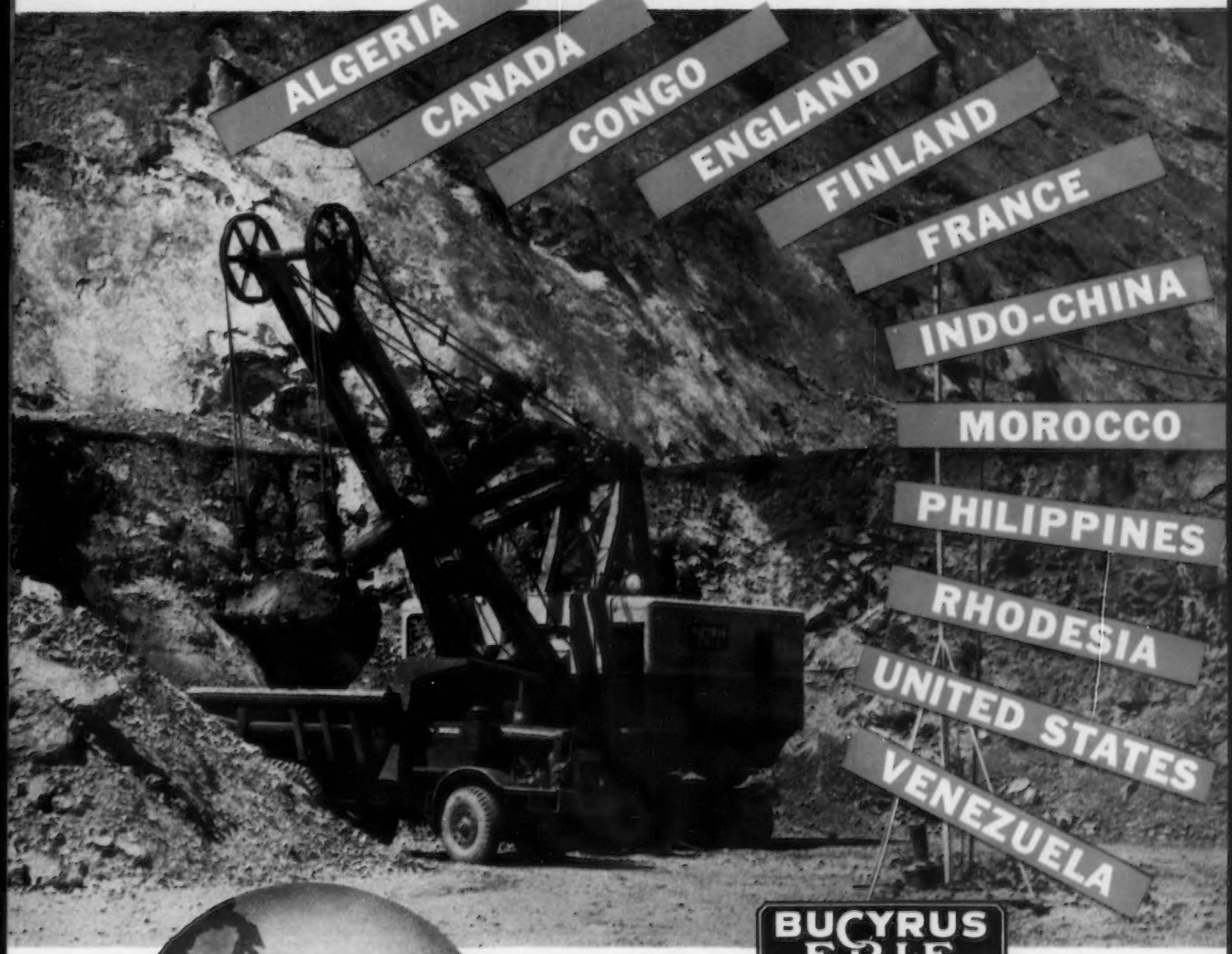
AR55-4

GLOBAL APPROVAL



110-B 4½ cu. yds.
150-B..6-cu. yds.
190-B..8-cu. yds.

Scores of these outstanding excavators have proven their worth in varied quarrying, mining, and heavy-duty construction projects all over the world.

Remember, FOR THAT EXTRA MARGIN — in design, in construction, in all round performance, and, above all, in output — it's BUCYRUS-ERIE Ward Leonard electric excavators. 42L55C

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

Mack Model LRSW hauling off overburden.

big shovels call for big trucks

Today's big-yardage jobs demand maximum loads per haul and faster time cycles from shovel to dumping point and return. Increasing use of larger and larger shovels points to the Mack Models LRSW and LRVSW six-wheel dump trucks as the answer to these stepped-up requirements.

Here are trucks that are built to keep big shovels on the go...to give mine operators increased production per driver and per truck dollar invested.

These Macks will move 21 to 28 yards with unfaltering ease over the toughest terrain. No miring in with these Macks—they have the advantage of Mack's famous Balanced Bogie with exclusive Power-Divider, enabling them to pull through where other trucks bog down. In actual service these models have demonstrated their ability to maintain the time schedule of smaller-capacity dumpers.

Why not investigate the big-unit economy of Mack Models LRSW and LRVSW. It will pay you to see these big jobs at work.

MACK TRUCKS Empire State Building, New York 1, N. Y.

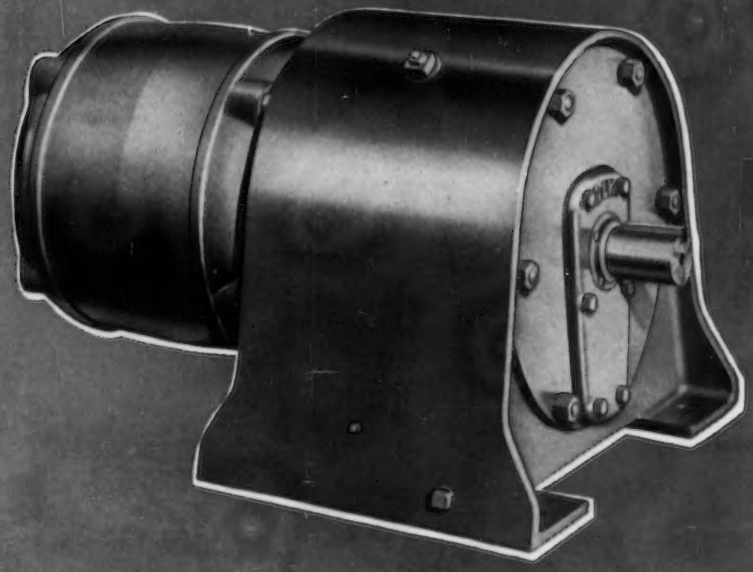
3030

Announcing the *-Newly Designed-* Integral

ALL-STEEL FALK Motoreducer

(Gearmotor Type–Supplementing Falk All-Motor Line)

. . . with completely standard round-frame, D-flange motor



Check and Compare these features...

Meet a faithful old friend in a new, modern dress! The famous, time-proved Integral Type *all-steel* Falk Motoreducer (Supplementing Falk All-Motor Line) has been redesigned into a compact, streamlined unit providing the utmost in space economy—but retaining all the application versatility, long-life performance, easy-maintenance features and superior structural qualities that have made Falk Motoreducers the recognized standard throughout industry.

In this new Integral unit—rated in accordance with AGMA standards—a *completely standard* round-frame, D flange NEMA motor is mounted directly on the all-steel Motoreducer housing. The motor remains a separate piece of equipment, readily replaceable with any other type or make. Output speed (ratio) can be changed within unit's torque capacity without modifying motor. Size and arrangement of the standard housing permit wide ratio range—from 3.36:1 to 542:1.

In order to meet the greatest number of industrial application needs, the newly designed Integral Motoreducers are available in horizontal and vertical models, both in concentric and right-angle types; double, triple and quadruple reduction; horsepower range, 1 to 40 HP. Prompt stock shipment in standard ratios is offered.

Whatever your reduction requirements, you get greatest dollar-for-dollar value in the long run by standardizing on Falk products. Write for Bulletin 3104.

Every FALK Motoreducer has these "In-built" Factors—

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

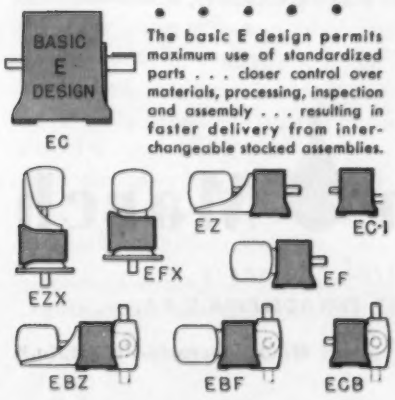
All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Sealed Housings. Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splash-proof, leakproof, dustproof.



The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

FALK ...a good name in industry

THE FALK CORPORATION . 3001 W. Canal St. . Milwaukee 8, Wis.

WRITE FOR BULLETIN 3104

Put the lid on DUST in your Mine Operations...

with a Johnson-March engineered Dust Control System!

Whatever your dust problems, there's a Johnson-March engineered system to solve it at surprisingly low cost. Johnson-March engineers have an outstanding record of successful dust control installations in all mining operations.

LIQUID DUST CONTROL—If your operation includes the handling of bulk materials such as ores, coal, coke, rock, bauxite, etc., an economical J-M system can be employed to stop dust at crushers, conveyors, screens, loading and unloading bins, elevators, or wherever dust occurs. J-M liquid systems cost only 1/10 that of most dust handling systems.

DRY COLLECTION—J-M Dual-Clone Dust Collectors and Reverse Air Jet Filters are designed for high efficiency dust collection, including submicron particles and recovery of valuable materials.

Have the Johnson-March engineering service analyze your dust problem, and see how easily and economically you can eliminate your dust nuisance and hazard. Mail the coupon today, at no obligation.

THE JOHNSON-MARCH CORP. E&MJ
1724 Chestnut St., Philadelphia 3, Pa.

At no obligation, please

- ☐ Send informative data on J-M dust control systems.
- ☐ Have an engineer analyze our dust problem at no obligation.

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COMPANY.....

ADDRESS.....

CITY..... STATE.....

Johnson March

Dust Control Engineers

1724 CHESTNUT STREET, PHILADELPHIA 3, PA.

INTRODUCING THE

INTERNATIONAL DROTT 4-in-1 Skid Shovel

BULLDOZER—The bullclam is wide open and the rear of the bucket becomes the dozer. Depth of cut is regulated by forward and backward pitch of the blade.

BULLCLAM—By opening the clam 10 inches the cutting edge is lowered 2 inches. As the unit moves forward material boils into the bullclam.

SKID-SHOVEL—With clam closed, straight-forward loading of the shovel is accomplished by rolling the whole bucket forward to excavate. When filled it is rolled back over the Skid-Shoes to retain heaped load.

CLAMSHELL—Opening bullclam wide makes it possible to operate as a clamshell. Clam is brought down into material and closed by hydraulic pressure.

Hydraulic Selector Lever Converts Latest Addition to INTERNATIONAL DROTT line into a...

❶ BULLDOZER ❷ BULLCLAM

❸ SKID-SHOVEL ❹ CLAMSHELL

Here's the unit that answers every requirement for a single machine capable of handling a wide variety of jobs.

It's the NEW 4-in-1 multipurpose addition to the famed INTERNATIONAL DROTT Skid-Shovel line and it's available on INTERNATIONAL TD-6 and TD-9 crawlers.

The 4-in-1 can immediately be changed into a Bulldozer, Bullclam, Skid-Shovel or Clamshell by merely shifting the "shovel-selector" lever into the desired position. The lever is at the operator's finger tips, and shovel selection can be made whether the tractor is in motion or standing still. For fast loading of any material, the 4-in-1 can be operated either as a forward dump or bottom dump shovel.

Like all products in the INTERNATIONAL DROTT line, the new 4-in-1 reduces wear and strain on the tractor by transporting heaped loads on the exclusive Skid-Shoes. These same Skid-Shoes provide 300% greater break-out force than on competing shovels. There's the exclusive "Hydro-Spring" feature, too, that absorbs 70% of the shock normally encountered in front-end loaders for increased operator comfort and longer tractor life.

On specific earthmoving work such as excavating or loading the standard INTERNATIONAL DROTT Skid-Shovel is tops. But if you're looking for one machine to handle many jobs, the 4-in-1 is it.

For a demonstration, call your INTERNATIONAL Industrial Distributor today.

DROTT MANUFACTURING CORP., MILWAUKEE 8, WISCONSIN
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

FREE—NEW 4-IN-1 CATALOG

INTERNATIONAL HARVESTER

INTERNATIONAL®
DROTT

Drott Mfg. Corp.,
3841 W. Wisconsin Ave.,
Milwaukee 8, Wisconsin

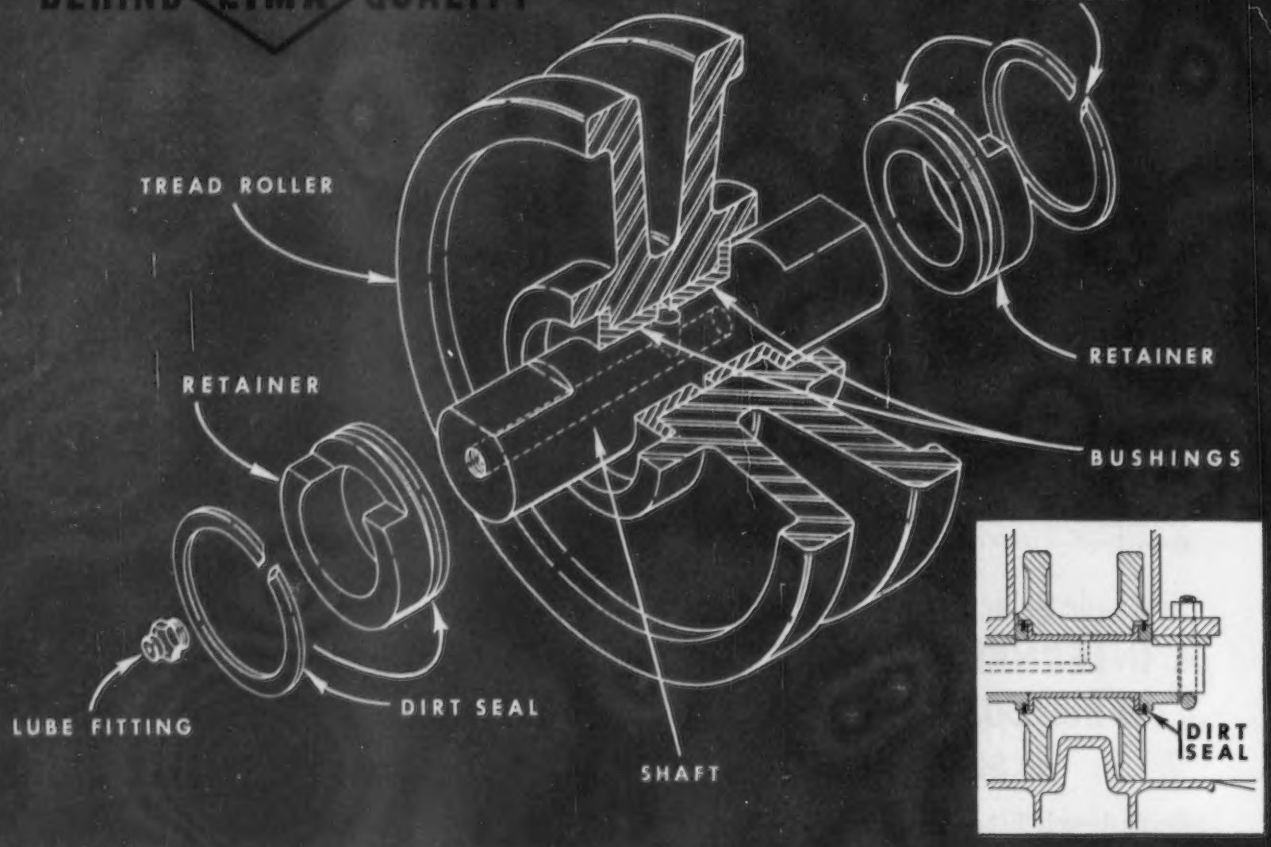
Gentlemen:
Please send the new 4-in-1 catalog to:

NAME_____

ADDRESS_____

CITY_____ STATE_____

BEHIND LIMA QUALITY



LIMA dirt seals cut down-time and maintenance costs

Effective piston-ring-type dirt seals in the tread rollers are another quality "extra" you get when you use a LIMA. Abrasive material which wears out the bushings and shafts of ordinary machines is excluded. LIMA seals the lubricant in and dirt out to reduce friction and prolong the life of bushing, roller and shaft.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-ring-type dirt seal rings and retainers.
2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of the center of rotation.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (optional).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts.

The features listed above contribute to LIMA'S greater output with less down time and lower maintenance costs. Users agree! It costs less to own a LIMA!

This LIMA demonstrates the importance of LIMA'S dirt seals and grease retainers.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.

SYMONS VIBRATING ROD GRIZZLIES for heavy duty big capacity scalping from ½" up to about 4".

SYMONS VIBRATING BAR GRIZZLIES for heavy duty large capacity primary scalping from 1½" upwards.

SYMONS VIBRATING ROD DECK SCREENS for low cost, big capacity screening of wet and sticky material.

SYMONS® SCREENS

...from the *HEAVIEST SCALPING*

...to the *FINEST SCREENING*

SYMONS HORIZONTAL SCREENS for level, positive screening with greater capacity of more accurately sized products . . . ideal for asphalt plants—with drive outside dust and heat.

● *SYMONS VIBRATING SCREENS* have been serving the non-metallic minerals industry for almost twenty years. The wide range of types and sizes enables you to select the *right* screen for your particular application.

These quality screens have gained an enviable reputation for dependability, efficiency and economy... backed by the same high standards of accuracy, design and workmanship, and the same advanced engineering that is used in the manufacture of *all* Nordberg Machinery.

Mail the coupon for further details.

SYMONS "V" SCREENS for big capacity single cut wet or dry separations—even in much finer meshes than possible with conventional screens.

SYMONS... A Registered Nordberg Trademark Known Throughout the World

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

MAIL THIS COUPON TODAY

NORDBERG MFG. CO., Milwaukee, Wisconsin EM

Please send me further information on the following screens

☐ Symons Horizontal Screens ☐ Symons "V" Screens
☐ Symons Rod Deck Screens ☐ Symons Grizzlies

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

S254

you can't knock it down if you don't drill it first

Easily-damaged, undependable cable is not cheap at any price. This is particularly true of open pit mining operations where the economical operation of much expensive equipment rests on its ability to keep working through each and every shift.

It is in such situations as this that TIREX Cables with their cured-in-lead, Selenium Neoprene Armor can mean the difference between a smooth-flowing job and one with stop-and-go operations. Only smooth-flowing jobs have low costs.

Portable cables are particularly subject to abuse and to deterioration from weather. Since they are the only pathway for power, isn't it just good common sense to buy the best portable cables you can find for powering your drills? That means TIREX, of course. TIREX has the toughest, most abrasion-resistant jacket available on a portable cord or cable. That's why we say be sure you specify and then be sure you get TIREX.

Simplex

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

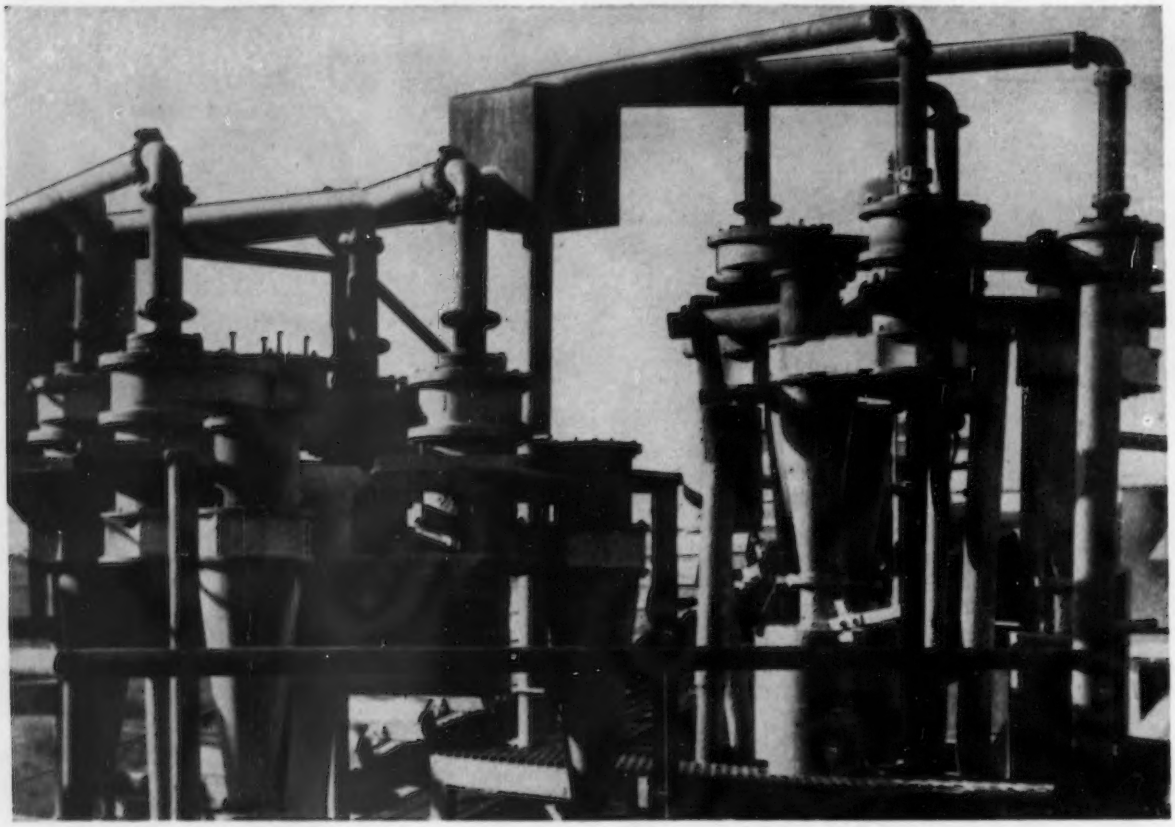
Wire Rope at Work—Looking a bit like a prehistoric dinosaur, this huge dragline excavator gobbles up 22 cu yd of earth at a single bite. The mechanical monster is owned by International Minerals & Chemical Corporation, and it is shown here stripping overburden from rich phosphate deposits near Bartow, Fla. The company mines and processes the phosphate, which is subsequently used in fertilizers, stock feeds, and various industrial products.

Large-scale stripping of this kind places terrific burdens upon the steel cables. To withstand the high stresses and abrasive wear, the big excavator used two kinds of Bethlehem Purple Strand wire rope for the job shown above—1¼-in. 6x41 for the hoist lines, 2¼-in. 6x25 for the draglines. This combination assured not only the necessary strength, but the long life that kept rope expense at a minimum.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING



KREBS CYCLONES

. . . negligible wear after a year of operation on coarse feed

Krebs cyclone liners are a special moulded pure gum rubber that far outlasts ordinary porous gum rubber. Literature on cyclones often refers to rubber linings lasting weeks or sometimes only days on feeds as coarse as that listed here. Compare this with the full year service of Krebs cyclone liners without appreciable wear!

These moulded pure gum rubber liners are dense, smooth, and *replaceable* . . . an important factor in simplified and economical maintenance.

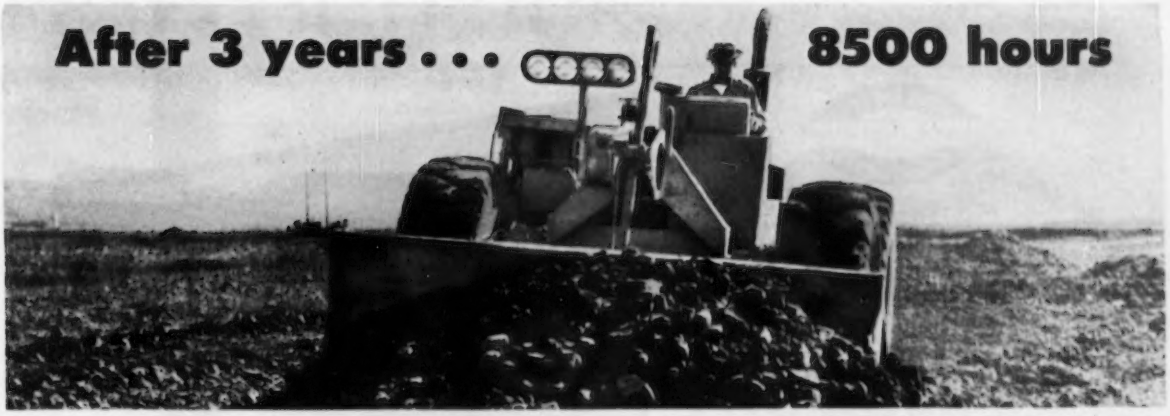
Krebs cyclones are precision made with machined steel shells. Fitted with the pressure moulded liners, their complete weight is far less than cast iron or nihard cyclones. Engineered for an idealized force pattern, Krebs cyclones in sizes from 4″ to 30″ are available either in single or integral two stage units. Long sweep inlet and adjustable valve are standard on all models. Special designs are available for unusual classifications. All units permit a wide change of inlet size, vortex size, and apex valve for changes in objectives.

FEED TO CYCLONES
32% SOLIDS

Mesh	%wt.
4	0.3
6	2.6
8	6.9
10	10.0
14	11.2
20	7.3
28	10.2
35	8.4
48	9.5
65	6.3
100	5.2
200	4.6
—200	17.5

Our metallurgical staff and pilot plant facilities are available on request. Details of your classifications are invited.

EQUIPMENT ENGINEERS, INC.
41 SUTTER STREET ● SAN FRANCISCO 4, CALIFORNIA



Dozing river-bottom rock and gravel within reach of dragline, Tournatractor moves up to 2½ cubic yards per push. Material, hauled by truck to crusher, will ultimately be used as finished aggregate on a new section of U.S. Highway 99E, south of Chico.

Mechanical efficiency 95%

1 original tire still working

How many hours' service do you get from a set of tracks?

Whatever the figure, take a look at the record of a Tournatractor owned by Richter Brothers, Oroville, California.

Their machine is about 3 years old. Three of its original tires were replaced at about 7,000 hours. The fourth is still going strong at 8,520 hours! (See right front tire in above photo.)

Remember, too, that Tournatractor's 19 mph speed enables it to cover 2 to 3 times as much ground as your crawler would in the same number of hours.

Richter Brothers have given their versatile Tournatractor the toughest kind of jobs, too.

On levee job near Corcoran, Tournatractor push-loads electric-control C Tournapulls with 11 pay yards of heavy, wet, lake-bottom gumbo in 30 seconds.

Tire wear small, even in rock

One recent assignment, for example, involved feeding river-bottom rock, sand, and gravel to a dragline. Here, Tournatractor pushed enough material to the loader to maintain production rate of 700 cu. yds. per 7-hour shift. In spare time, it maintained truck haul road. The abrasive and rocky material had little effect on Tournatractor. Its big low-pressure tires rolled *over* the grit instead of grinding *through* it.

On another assignment, Tournatractor helped 4 Tournapulls move 127,500 yds. of lake-bottom gumbo in 35 days for a levee at Corcoran, Calif.

Averages 15 mph job-to-job

Tournatractor also recently leveled 500 acres of farm land and did such highway construction work as push-loading scrapers, dozing, and pulling compactors. All job-to-job moves were made under rig's own power . . . a typical trip, Corcoran to Oroville, Calif. (300 miles), took only 20 hours. In 3 years, the machine has been 95% mechanically efficient, according to the owner. Says William C. Richter, owner also of 7 Tournapulls, "We have very little downtime with LeTourneau-Westinghouse equipment."

Says Operator Earl Sheppard, "I like Tournatractor especially well for dozing, clean-up work, and push-loading. It's fast and easy to operate."

Ask us to show you and your operators what these advantages can mean on your job. Call to arrange a demonstration.

Tournapull—Trademark Reg. U.S. Pat. Off.
Tournatractor—Trademark T-661-S-bw

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump

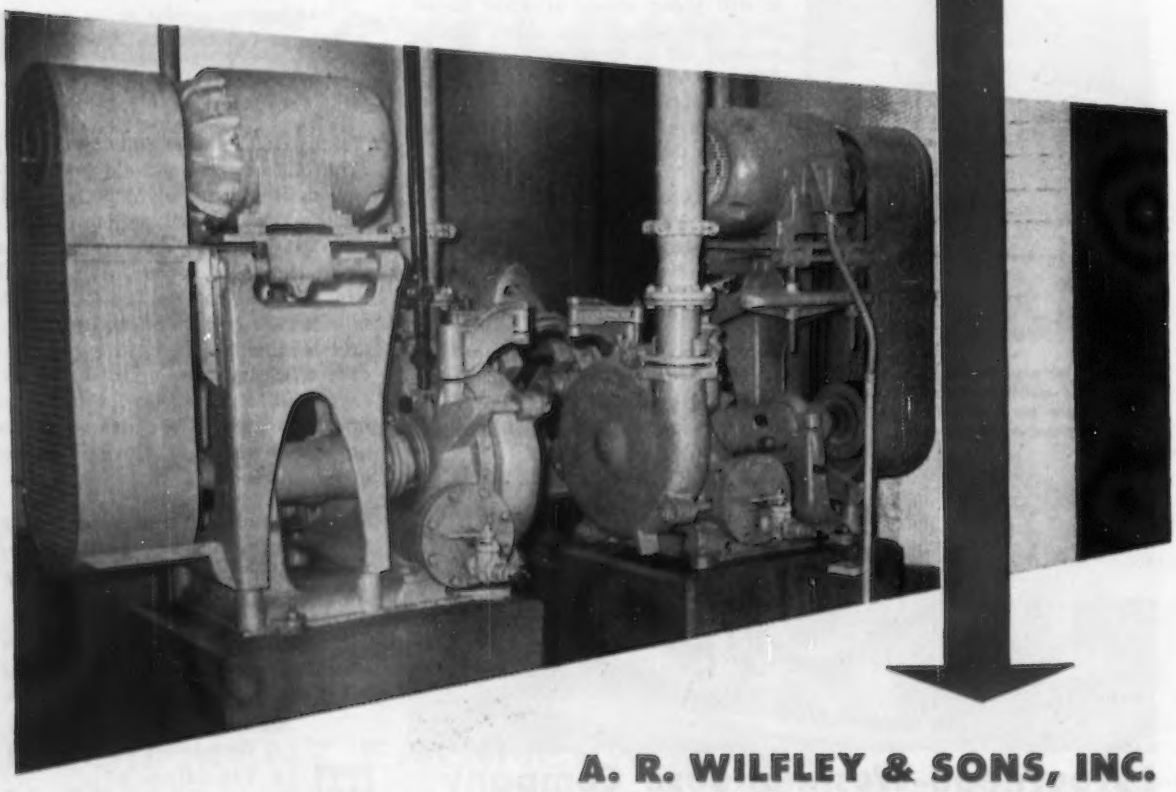
Greater Savings...

WILFLEY
centrifugal PUMPS

through High Efficiency and Economy

Wilfley Model "K" Sand Pumps meet every cost-saving requirement in handling sands, slurries and slimes. These famous pumps definitely increase production and create measurable savings in operating costs. Individual engineering on every application. Write or wire for complete details.

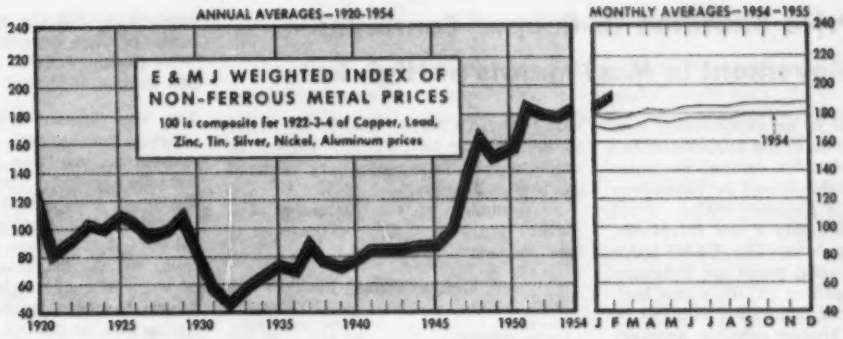
Pictured here is a Wilfley installation in a new potash refining plant. These new Model "K" pumps provide maximum pumping efficiency, even on the most difficult applications.



A. R. WILFLEY & SONS, INC.
Denver, Colorado, U.S.A., New York Office: 1775 Broadway, New York City

E&MJ OUTLOOK

PRICES



MARKETS

Higher monthly averages for copper, aluminum and tin pushed *E&MJ*'s nonferrous metals price index up sharply to 197.03 in February, an all time high, and nearly 10 points higher than 187.74 for January.

Copper demand was exceptionally brisk because of continued foreign price strength and growing conviction that high domestic consumption could extend well into 1955. European demands have topped all expectations. A significant drift of copper behind the Iron Curtain bolsters the foreign picture. The 3c spread between foreign and domestic copper prices is pressuring the market for readjustments.

Copper production, hampered by strikes and other bottlenecks for the past six months, should get back to normal by mid 1955.

●

LABOR

Left-wing unions, seeking to come under the protective wing of the AFL-CIO merger move, aren't meeting with success. See p. 116.

High point in forthcoming labor negotiations will be the guaranteed annual wage demands of the CIO Electrical Workers, and the CIO Auto Workers.

●

AT HOME

Automobile production at a rate of 9-million cars a year, is an important prop in the current industrial boom. The weight of zinc die castings used in front ends of 1955 models is eight times the weight of castings for 1954 models.

As February drew to a close heavy construction industries were up about 40% as compared with a year ago; automotive production, up 39%; electric power output, up 16%; and stock prices, up 41%.

Fears over uranium milling bottlenecks have been unnecessarily stressed. Stockpiles and ore reserves must be built up under AEC's program to assure continued operation of new mills. AEC's accelerated mill expansion is moving ahead steadily.

Moly Corp's rare earth operation in southern California is producing at the rate of 3,000 tons of 10% ore per month.

Freeport Sulphur Co. and Pittsburgh Consolidated Coal Co. have formed National Potash Co. A $19-million project near Carlsbad is planned to produce about 400,000 tons of potash a year.

Southern Pacific Co. is organizing a large metallic and non-metallic ore search to cover some 5-million acres of company property.

●

ABROAD

Chile's president held up signing the copper bill because it failed to include a Copper Institute plan which would give the producers a greater say in marketing the metal.

E&MJ's European correspondents are virtually unanimous that the heavy metal demand over there will continue to soar.

MARKETS—Trends and Prices

Strong Price Situation in Copper Continues—Buying Movement in Most Metals at High Rate

STIMULATED by an exceptionally high rate of production in the automobile and construction industries, demand for major nonferrous metals showed no indications of slackening as February ended. Price movements, with only a few exceptions, favored the producer. The *E&MJ* index of nonferrous metal prices for February was sharply higher at 197.03, a new high for the movement, comparing with 187.74 for January. Higher monthly averages for domestic copper, aluminum, and tin caused the upturn.

Copper in the U.S. market was maintained at 33c per pound throughout the month, with the undertone strong as European buyers continued to bid for metal at much higher prices. Prices realized in the foreign division varied from a low of 32.775c to the high of 42.602c, f.a.s. N.Y. equivalent. There was widespread distrust over the extraordinary activity in copper. Fear that the price might get out of hand over-stimulated the demand.

Rhodesian mines began hiring new workers early in the month to replace those who refused to return to their jobs. Toward the end of February production of blister by the Rhodesian companies was at approximately 70% of capacity. Despite this favorable development, European consumers felt that the supply situation would remain tight well into the second quarter of the year and they acted accordingly. Production is increasing, but not at a rate to build up a surplus this side of June.

Domestic fabricators again appealed to the Government to divert copper to industry now earmarked for the stockpile. Some fabricators claimed that they could not operate their plants without obtaining additional tonnages. Just as the month ended it was announced in Washington that March delivery metal would be released temporarily from the Government's inventory. The quantity involved was 8,000 tons.

Fabricators in the U.S. shipped the equivalent of 136,539 tons of copper to their customers during January, against 97,198 tons in December. Year-end inventory adjustments accounted for part of the January increase in shipments. A strong price situation also was a factor. Producers are counting on apparent consumption to average close to 120,000 tons a month over the first half of the year.

Combined U.S. and foreign stocks of copper were reduced during January by 23,372 tons. This loss resulted largely from work stoppages at Rhodesian mines. Production of primary crude outside of the U.S. declined from 129,796 tons in December to 110,857 tons in January. Production of primary crude in the U.S. increased from 85,581 tons in December to 87,350 tons in January. Output of crude copper from secondary material declined in January.

A summary of the December and January statistics of Copper Institute, in tons, follows:

United States

	(a) Dec. 1954	Jan. 1955
Production:		
Crude, primary	85,581	87,350
Crude, secondary	12,152	8,763
Totals	97,733	96,113
Refined copper	133,523	123,840
Deliveries, refined	119,626	113,949
Refined stocks, at end	47,108	45,982

Outside United States

	(a) Dec. 1954	Jan. 1955
Production:		
Crude, primary	129,796	110,857
Crude, secondary	380	350
Totals	130,176	111,207
Refined copper	109,112	85,590
Deliveries, refined	109,528	112,895
Refined stocks, at end	181,529	159,283

(a) Corrected figures.

Exporters of copper scrap and copper-base scrap were shocked as the Bureau of Foreign Commerce on Feb. 10 announced new procedures for licensing February-March quotas. In effect, the new regulation will limit exports for the two-months' period to 6,000 tons of copper scrap and 6,000 tons of copper-base alloy scrap. The new procedures, it was stated, reflect recommendations of copper refiners and exporters. In copper circles it was said that the regulations were tightened to limit exports and control the movement of scrap to prevent, if possible, the movement of metal to countries behind the Iron Curtain. Exports of copper scrap from the U.S. rose from 34,568 tons in 1953 to 75,830 tons in 1954. Copper-base alloy scrap exports rose from 33,613 tons in 1953 to 93,971 tons in 1954.

Lead quotations in the domestic market were easily maintained on the basis of 15c per pound, N.Y. Demand was quite active, pointing to a high rate of consumption in key industries, such as batteries, tetraethyl lead, and cables. The Government purchased its monthly quota for the stockpile. The foreign market was a steady affair. The f.a.s. Gulf quotation on foreign metal varied between 13¼c and 13½c per pound.

Zinc was a disappointment to those domestic producers who expected the price to rise above the 11½c basis. Demand was active on the die-casting grade as a result of a record annual rate of production of automobiles. Slab zinc stocks were reduced by 7,096 tons during January (see page 106). However, production increase again, rising to 86,106 tons for January. The Government purchased zinc for the stockpile. Imports of slab zinc in 1954 totaled 156,896 tons, which compares with 234,576 tons in 1953. Imports of zinc contained in ore during 1954 totaled 448,624 tons, against 513,383 tons in 1953.

Tin was firmer, largely on reduced offerings from outside sources. Switching operations, involving sterling exchange, virtually ceased. The London Metal Exchange has moved to control such operations by inserting a clause in its contract that dollars or American account sterling be placed at the disposal of the Bank of England. Trading in futures has been restricted because of a feeling that the control scheme will come into play sooner or later.

Aluminum production in January increased to 128,203 tons, a new all-time high. Demand for aluminum has been active and in the secondary division of the industry prices paid moved well above the quotations named for the primary product.

Quicksilver was firmer because of a delay in obtaining Mexican metal under a

Average Prices for February (E&MJ Quotations)

Copper:	
Electrolytic, domestic refinery	32.700
Electrolytic, export, refinery	36.236
Lead:	
Common, New York	15.000
Common, St. Louis	14.800
Silver and sterling exchange:	
Silver, New York, per oz.	85.250
Silver, London, pence per oz.	74.088
Sterling Exchange, "Checks"	278.360
Zinc:	
Prime Western, East St. Louis	11.500
Prime Western, delivered (g)	12.000
Tin:	
New York Straits	90.835
New York, 99% min. (e)	89.835
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$322.000
Antimony (E&MJ) (d)	31.970
Antimony, bulk, Laredo	28.500
Antimony, in cases, Laredo	29.000
Platinum, refined, per oz.	$78.545
Cadmium (a)	170.000
Cadmium (b)	170.000
Cadmium (c)	170.000
Aluminum, 99% plus ingot	23.200
Magnesium, ingot	27.000
Nickel (f)	64.500

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.
(a) Cadmium average based on the producers' quotations.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lots, packed in case f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.
(g) Delivered where freight exceeds 0.5c.

Markets Continued on Page 106

licensing plan now in effect. Demand was inactive. European producers have been offering the metal sparingly, and U.S. mines have been enjoying a well sold-up position.

Cleveland-Cliffs announced an increase of 20c per gross ton on its iron ore from the Mesabi Range and an increase of 10c on Marquette Range blast furnace ore. With the steel industry operating at 90% of capacity, consumption of iron ore, manganese and chrome has picked up appreciably. Indian manganese ore strengthened on higher prices named by shippers, even though new buying has not been heavy. The price situation in chrome ore was about unchanged. Tungsten ore was higher as buying from European account and improved business here absorbed good tonnages.

"Free" Gold Market

The volume of trading in "free" gold declined about 10% during February as political tension over Formosa eased. The panicky conditions in the Far East virtually ceased. There were no Russian sales. Coin markets were lower. Pick's World Currency Report quotes on "free" gold, per fine oz. as follows:

	COINS		BARS (12.5 kg)	
	Jan. 31	Feb. 28	Jan. 31	Feb. 28
NEW YORK, transit	.....	.....	$35.10	$35.10
MANILA	$40.50	$40.25	37.65	37.50
HONG KONG	40.10	39.90	38.30	38.00
BOMBAY	53.75	50.25	53.50	49.50
TANGIER	39.25	39.30	35.05	35.05
BEYROUTH	39.90	40.10	35.20	35.22
PARIS	39.50	39.50	35.75	35.70
BUENOS AIRES	42.60	40.25	38.75	38.50

Note: All prices are computed at the free or black market value of the U.S. dollar in the local markets.

Major Metals

U. S. DAILY AND AVERAGE PRICES

Feb. 1955	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc Delivered (f)	Zinc East St. Louis
1	32.700	34.050	89.625	15.000	14.800	12.000	11.500
2	32.700	34.800	90.250	15.000	14.800	12.000	11.500
3	32.700	36.000	90.250	15.000	14.800	12.000	11.500
4	32.700	34.500	91.500	15.000	14.800	12.000	11.500
5	No Market	34.500	91.500	15.000	14.800	12.000	11.500
7	32.700	37.775	90.750	15.000	14.800	12.000	11.500
8	32.700	36.750	91.250	15.000	14.800	12.000	11.500
9	32.700	35.300	91.750	15.000	14.800	12.000	11.500
10	32.700	36.075	91.000	15.000	14.800	12.000	11.500
11	32.700	36.825	91.000	15.000	14.800	12.000	11.500
12	Holiday	36.400	Holiday	Holiday	Holiday	Holiday	Holiday
14	32.700	36.675	90.250	15.000	14.800	12.000	11.500
15	32.700	38.175	90.125	15.000	14.800	12.000	11.500
16	32.700	36.100	90.000	15.000	14.800	12.000	11.500
17	32.700	37.600	90.375	15.000	14.800	12.000	11.500
18	32.700	38.425	90.750	15.000	14.800	12.000	11.500
19	No Market	34.900	90.750	15.000	14.800	12.000	11.500
21	32.700	36.900	90.500	15.000	14.800	12.000	11.500
22	Holiday	36.300	Holiday	Holiday	Holiday	Holiday	Holiday
23	32.700	36.250	91.250	15.000	14.800	12.000	11.500
24	32.700	36.800	91.125	15.000	14.800	12.000	11.500
25	32.700	36.500	91.375	15.000	14.800	12.000	11.500
26	No Market	36.500	91.375	15.000	14.800	12.000	11.500
28	32.700	35.575	91.125	15.000	14.800	12.000	11.500
AVERAGES FOR MONTH							
Feb.	32.700	36.236	90.835	15.000	14.800	12.000	11.500
AVERAGES FOR WEEK							
Feb.							
2	31.250	34.433	89.604	15.000	14.800	12.000	11.500
9	32.700	35.804	91.250	15.000	14.800	12.000	11.500
16	32.700	36.708	90.475	15.000	14.800	12.000	11.500
23	32.700	36.729	90.725	15.000	14.800	12.000	11.500
CALENDAR WEEK AVERAGES							
Feb.							
5	32.325	34.996	90.646	15.000	14.800	12.000	11.500
12	32.700	36.521	91.150	15.000	14.800	12.000	11.500
19	32.700	36.979	90.375	15.000	14.800	12.000	11.500
26	32.700	36.542	91.125	15.000	14.800	12.000	11.500

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Feb. 1955	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
1	278.4687	85.250	73.750d.	251s. 7¼d.	$35.00
2	278.4687	85.250	73.750d.	251s. 7¼d.	35.00
3	278.3906	85.250	73.750d.	251s. 8d.	35.00
4	278.3437	85.250	73.750d.	251s. 9d.	35.00
5	(e)	(e)	(e)	(e)	35.00
7	278.3750	85.250	74.000d.	251s. 9d.	35.00
8	278.3437	85.250	74.000d.	251s. 9¼d.	35.00
9	278.2500	85.250	74.000d.	251s. 10d.	35.00
10	278.2500	85.250	74.000d.	251s. 11d.	35.00
11	278.2109	85.250	74.000d.	251s. 11d.	35.00
12	(e)	(e)	(e)	(e)	Holiday
14	278.2500	85.250	74.250d.	251s. 11d.	35.00
15	278.2304	85.250	74.250d.	251s. 11d.	35.00
16	278.2187	85.250	74.250d.	251s. 10½	35.00
17	278.1875	85.250	74.250d.	251s. 11d.	35.00
18	278.2265	85.250	74.250d.	251s. 11d.	35.00
19	(e)	(e)	(e)	(e)	35.00
21	278.2109	85.250	74.250d.	251s. 11d.	35.00
22	Holiday	Holiday	74.250d.	251s. 10½d.	Holiday
23	278.3437	85.250	74.250d.	251s. 9¼d.	35.00
24	278.7070	85.250	74.250d.	251s. 8d.	35.00
25	278.7500	85.250	74.250d.	251s. 6d.	35.00
26	(e)	(e)	(e)	(e)	35.00
28	278.6054	85.250	74.250d.	251s. 6d.	35.00
AVERAGES FOR MONTH					
Feb.	278.360	85.250	74.088	—	35.00
AVERAGES FOR WEEK					
Feb.					
2	278.462	85.250	—	—	—
9	278.341	85.250	—	—	—
16	278.232	85.250	—	—	—
23	278.242	85.250	—	—	—

Calendar Week Averages, New York Silver: Feb. 5th, 85.250; 12th, 85.250; 19th, 85.250; 26th, 85.250.

(e) No Market (Saturday)

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c per pound, the average differential for delivery charges.

(b) Our export quotations for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent. Atlantic seaboard. On f.a.s. transactions we deduct 0.075c for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c to 0.15c per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c per pound over the current market for Prime Western; Special High Grade 1.50c.

(f) Prime Western delivered where freight from E. St. Louis exceeds one-half cent.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New oYrk, as reported daily by regular suppliers, and is usually one quarter-cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver, if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5 per troy ounce 1000 fine, effective July 1, 1946. London silver is pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines . . .

G. P. Lutjen

If anyone besides a Chicagoan has ever seen the sun shine in the Windy City, we'd appreciate hearing about it. Man and boy, we've been flitting in and out of Chi for 20 years and the conviction is setting in that it is the only city in the world with a built-in overcast. Weather didn't make too much difference to the throngs attending the AIMMPE (P is for Petroleum, duly incorporated in the title this year). The Conrad Hilton worked hard at being the world's largest hotel and many, many miners testified that they spent the entire 4 days without leaving the premises except for occasional sallies across the street to the Blackstone for caucuses, short beers and such.

What with listening to papers here and there, fishing through the ice, and other miscellaneous activities, we didn't have much time for the Art Institute, which is a pretty fabulous place. Like a great many visiting miners and their wives, we did manage to see the collection of miniature reproductions of European and early American rooms. These rooms, each totally enclosed and seen through a glass window, were constructed on the scale of about one inch to the foot and every detail is perfect down to wine in the decanters and microscopic chessmen set up upon a chess board. After the first few rooms, we were fully prepared to see Alice chasing a well-dressed rabbit down the hall, or at least to find a bottle labeled "Drink Me." The latter, however, was more easily found back at the Conrad Hilton.

Other features of Chicago included a store on Dearborn St. which sells personalized portable pool cues. They fold in the middle for easy traveling and are probably utterly unreliable in a tight match. There is a choice of carrying cases which you may have monogrammed if you like.

Then there is Marshall Field's lurking on State St. (that great street, if you believe everything you hear). Many a family purchasing agent got loose in the mammoth emporium and we suddenly understood the point of that old bromide about the chap who left Chicago Ill.

The AIME meeting was a fine affair. We didn't count, but attendance must have been close to a record and everyone had a good time. A more official report will come your way next month; unofficially there are a few items we would like to applaud. First, the ladies of the Chicago Section. They did an excellent job of getting the bewildered masses on the right track.

The Mining Branch luncheon was worthwhile attending on two counts. First, to see Ed Gardner get a well deserved tribute as the Jackling Lecturer; and secondly to hear H. DeWitt Smith's forthright talk about the importance to the industry of increasing engineers' salaries.

In the technical meetings themselves, we doff our fedora to Messrs. Ratledge, Ong and Boyce of Tsumeb Corp., Ltd. for the excellent presentation they handed out on "Development of Metallurgical Practice at Tsumeb." Complete with tables, charts and flowsheets, the booklet made the entire paper a lot more valuable. The same is true of R. H. Feierabend, Freeport Sulphur Co., and D. S. Eppelsheimer of Missouri School of Mines for the fine folder they put out prior to the session they conducted as co-chairmen on "Training Engineers in the Minerals Industry." The speakers were good and having the material on hand permitted the listeners to concentrate on what they were saying without the added complication of taking notes. And incidentally, the speakers at this session had material worth taking notes on.

Growing interest in new management techniques and principles on the part of mining industry management, is increasingly evident. Not only was the topic more conspicuous on the AIME program, but even in many of the impromptu corridor sessions and in the proverbial smoke filled rooms. This quest for better ways to do the things that have always been done the same way is a good sign. But while there is much talking and some doing, there remains a group whose approach to change is perhaps best described by a story we heard in Chicago.

A lad from the Kentucky hills was making his way down a country road with his jug of White Lightening in one hand and his squirrel rifle in the other, when he came upon a stranger. With the true hospitality of the hills, he offered the stranger a drink.

The man protested that he didn't drink, whereupon the hill man leveled his shooting iron (or "shootin' arn," if you want it in dialect) on the stranger and said, "Drink!"

The stranger drank, turned purple, shook, staggered and finally spluttered, "Boy! That's awful!"

"Ain't it?" said the hill man amiably. "Now you hold the gun on me so's I can take a snort."

E&MJ operatives who journeyed out to Denver in February, tell us that the National Western Mining Meeting (alias the Colorado Mining Association Meeting) was a real rouser. The full report is available on pages 98 through 101. Sessions packed in as many as 1300 people which is a whole lot better than par. Uranium, of course, was the password and apparently you could have bought and sold half the Colorado Plateau without ever leaving your room at the Shirley Savoy.

Uranium is big business without question, and it stands in a fair way to become the nation's leading hobby, the most popular avocation since miniature golf. You begin to feel these things when your friends start getting Geiger counters instead of toasters for wedding presents. And in Colorado, at least, the amateurs aren't kidding. The local colleges and the Emily Griffith Opportunity School all seem to have programs for enlightening the would be prospectors.

At University of Colorado's extension in Denver, for instance, Howard Stafford of the AEC office, is teaching a course in "prospecting for radioactive minerals." There's another class in "organizing and investing in uranium companies." If a man's not careful he could wind up buying a couple of hundred shares in somebody's homework.

We're not sure whether or not this is Ogden Nash, but we've liked it ever since a colleague told it to us yesterday.

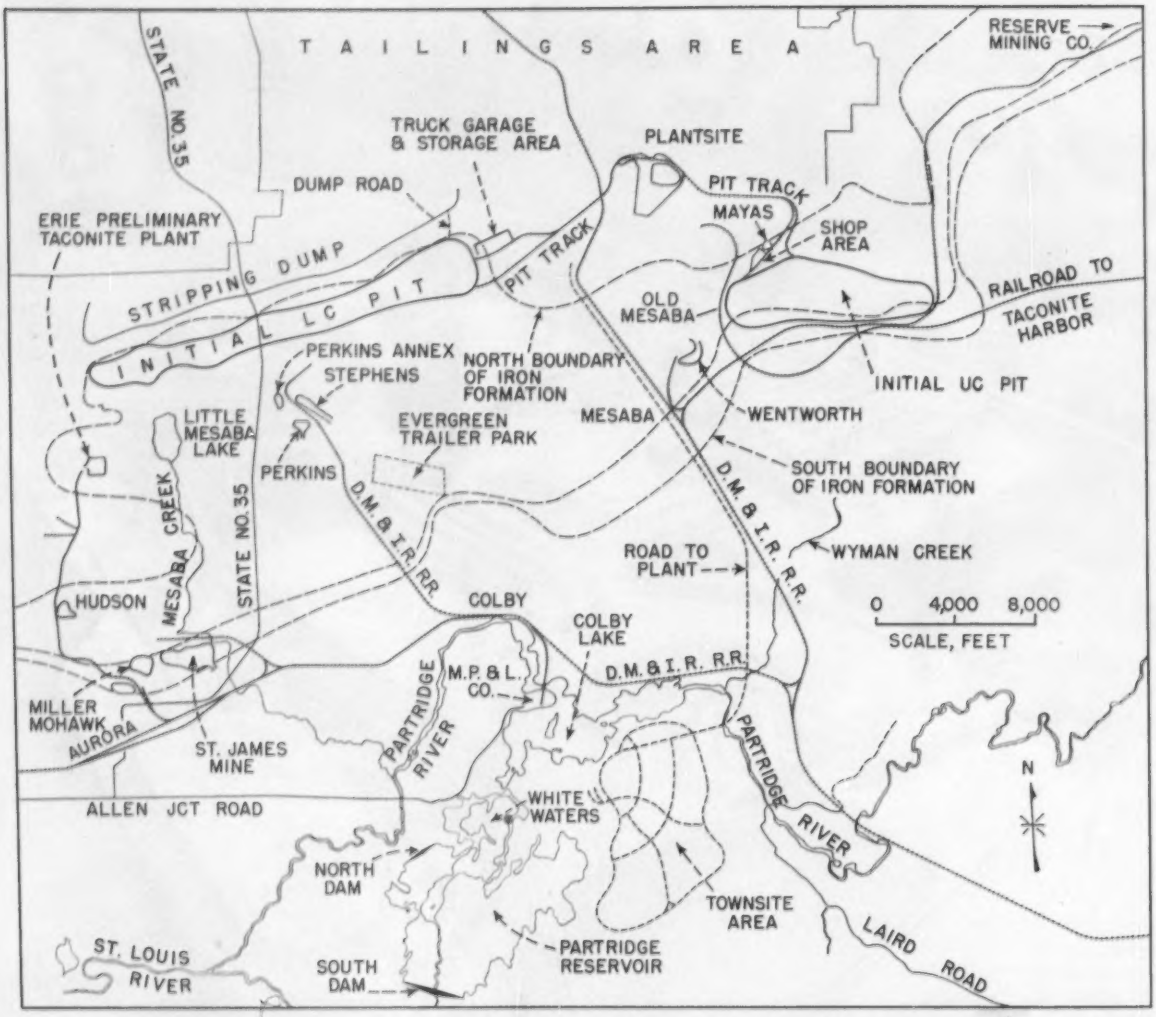
They aimed for Wong Lee
But shot Lee Wong.
A sad but excusable,
Slip of the Tong.

V. R. Flore

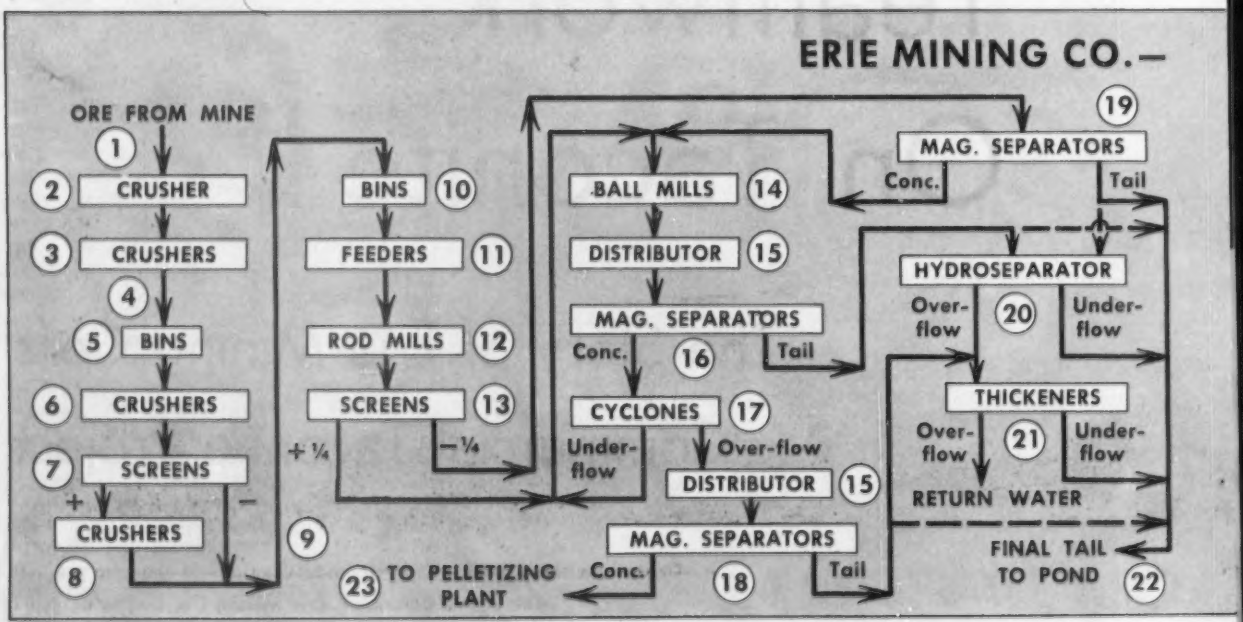
Teamwork On Taconite

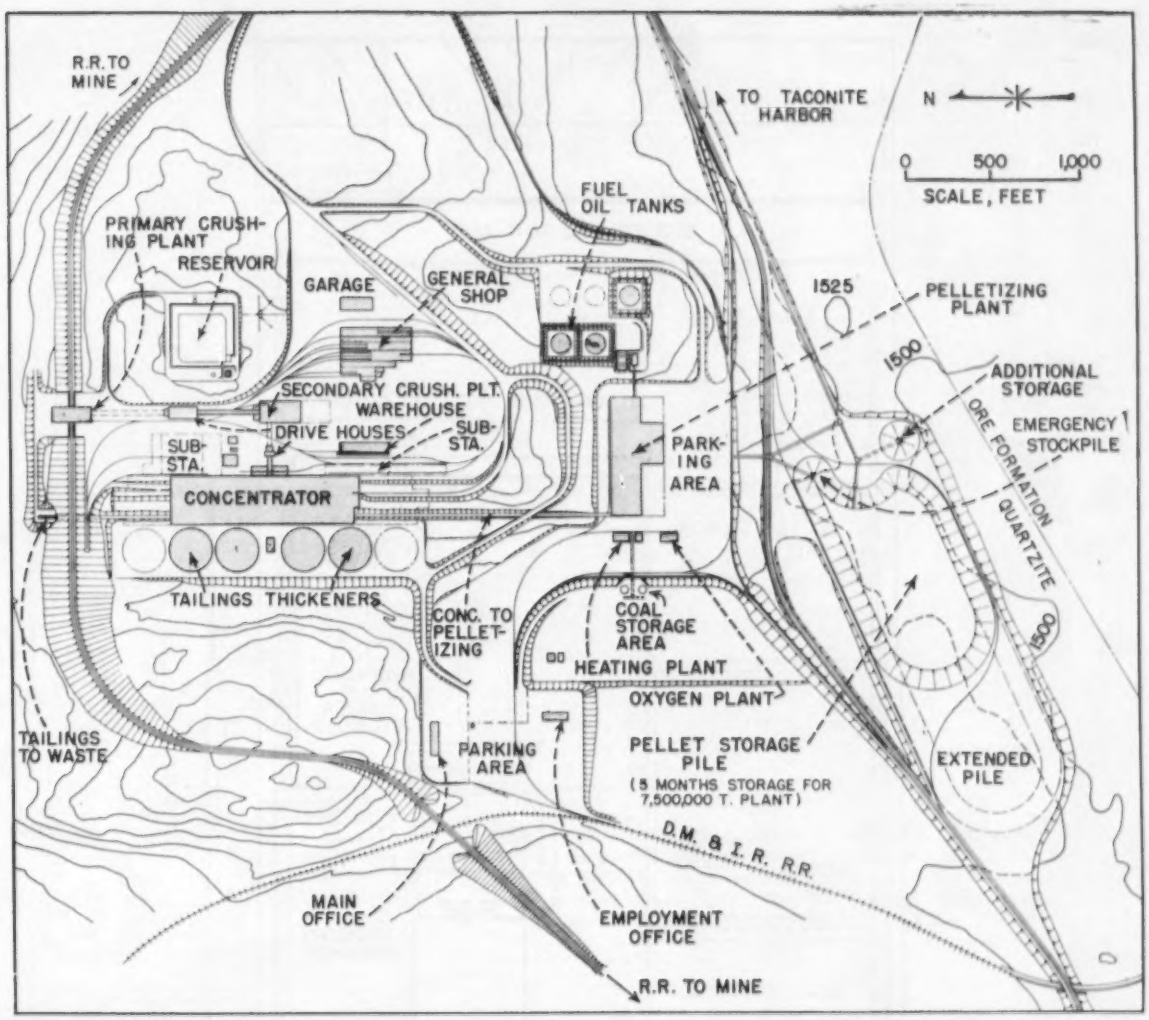
The Story of Erie Mining Co.'s Commercial Taconite Project

Please turn the page for a portfolio of drawings of the Erie project.
The article describing Erie Mining Co. begins on p. 82



PLANT SITE (upper center) is on top of Range, between new mines, near townsite and town of Aurora (left).



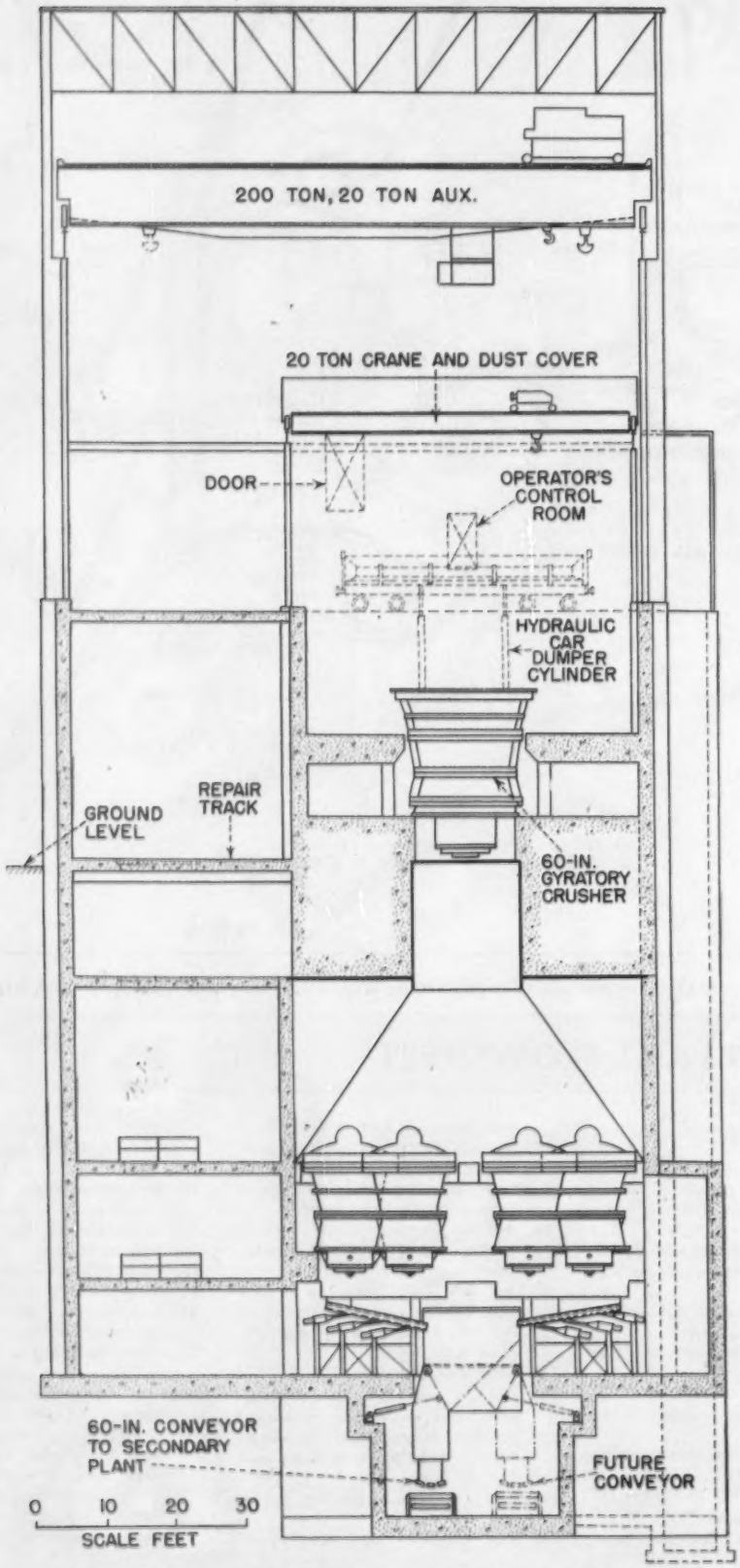


PLANT AREA, to produce 7,500,000 tons of pellets yearly. With 63,000 long tons capacity, plant is largest ever built as unit.

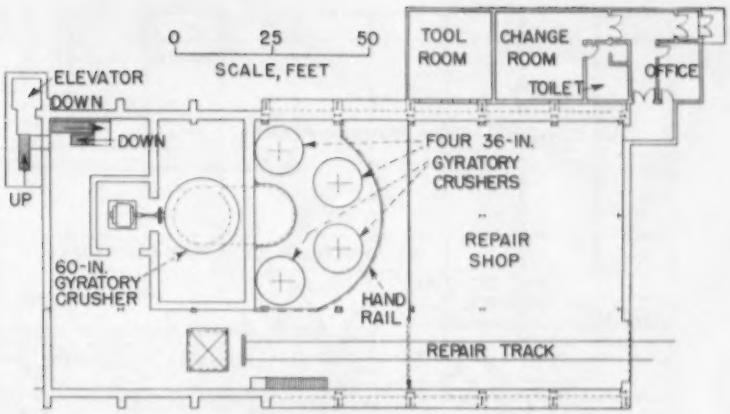
TACONITE PLANT FLOWSHEET

LEGEND

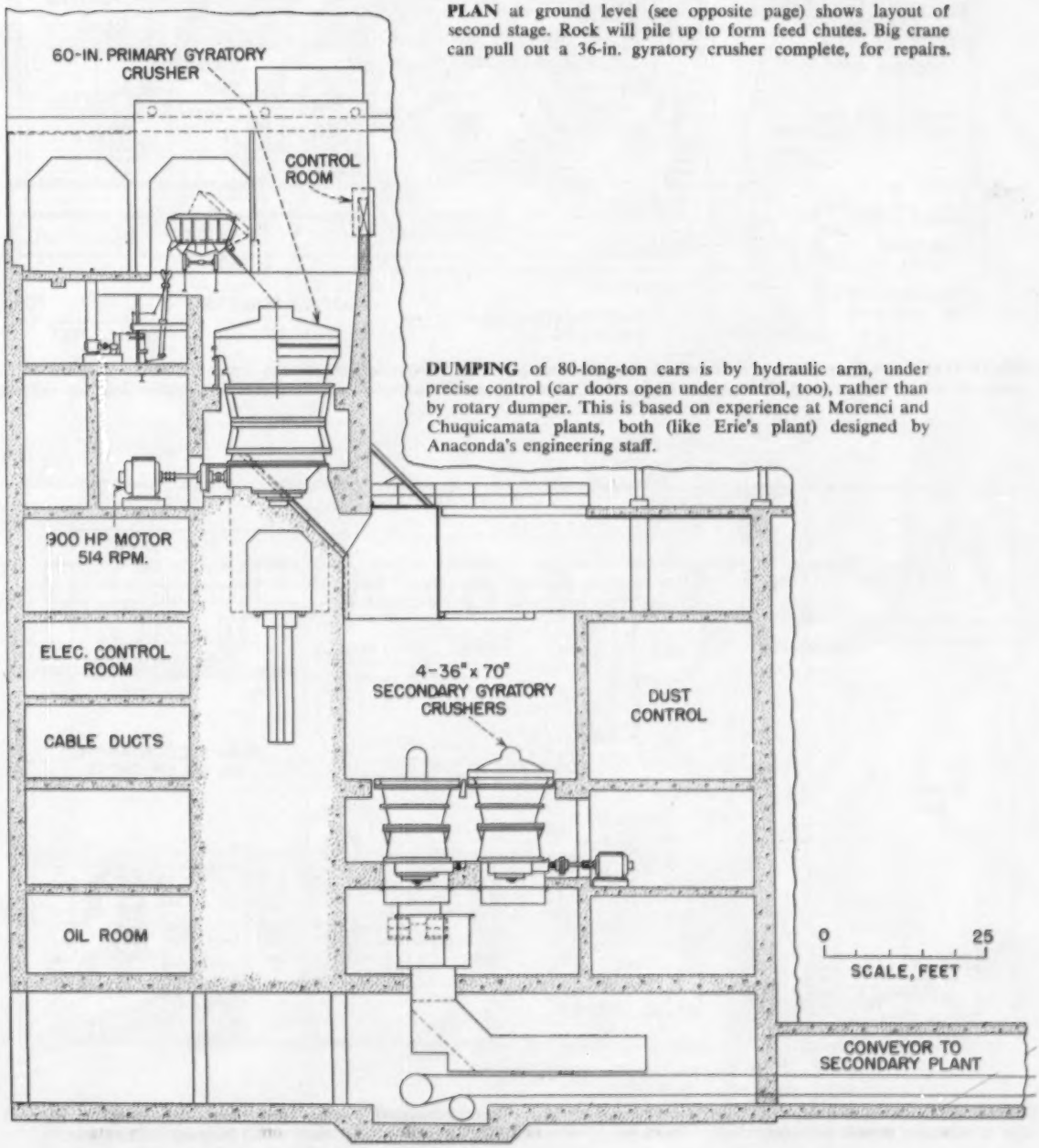
1. Ore mined by 6-yd. shovels; to plant in 80-ton side-dump railroad cars. Cars dumped at crusher by hydraulic arm.
2. Gyratory, 60-in., 900-hp motor.
3. Four 36-in. secondary gyratories, 400-hp motors.
4. Two 60-in. conveyor belts in series to secondary crushing plant.
5. 9000-ton bin (1500 tons per section) filled by traveling tripper.
6. Six 7-ft. standard cone crushers.
7. Twelve vibrating screens, ¼-in. opening, 6x10-ft.
8. Twelve 7-ft. shorthead cones.
9. Conveyor belt, 60-in.
10. Fine ore storage bin, 54,000 tons.
11. Vibrating feeders, 18x90-in., 12 per unit, 324 in all. Conveyor, 36-in., and belt scale lead to rod mills.
12. Rod mill, 10 ft diam., 14 ft. long, arranged 15 on one side of central repair bay, 12 on other. (See concentrator plan, drawings portfolio)
13. Rod mill discharge to one 5x8-ft vibrating screen, single-deck, ¼-in. openings.
14. Ball mills, 10-ft diam., 14 ft long. Same number and arrangement as rod mills. Trommel on discharge discards ⅛-in. oversize.
15. Mechanical distributors.
16. Magnetic separators, (ball mill cobbers), four single-drum, permanent magnetic, counter-rotation separators (36-in. diam., 60-in. face) per mill unit, 108 in all.
17. Five 14-in. cyclones per unit, 135 in all.
18. Final magnetic separators, three-drum, 30-in. diameter, 60-in. face, four counterflow separators per unit, 108 in all.
19. Magnetic separator, rod mill cobbers, two-drum, 36-in. diam., 39-in. face, two concurrent flow separators per unit, 54 in all.
20. Seven Hydroseparators, (18-ft. diam.) underflow at 45% solids.
21. Four thickeners, 255-ft. diam., underflow at 45% solids.
22. Combined tailing at about 19% solids, minimum, to tailings pond.
23. Final concentrate pumped by slurry pump to thickener and filter in pelletizing plant. Concentrate is about 33% of original feed by weight. About 35% of feed goes into rod mill cobber tailing; about 18% into ball mill cobber tailing; about 14% into final separator tailing.



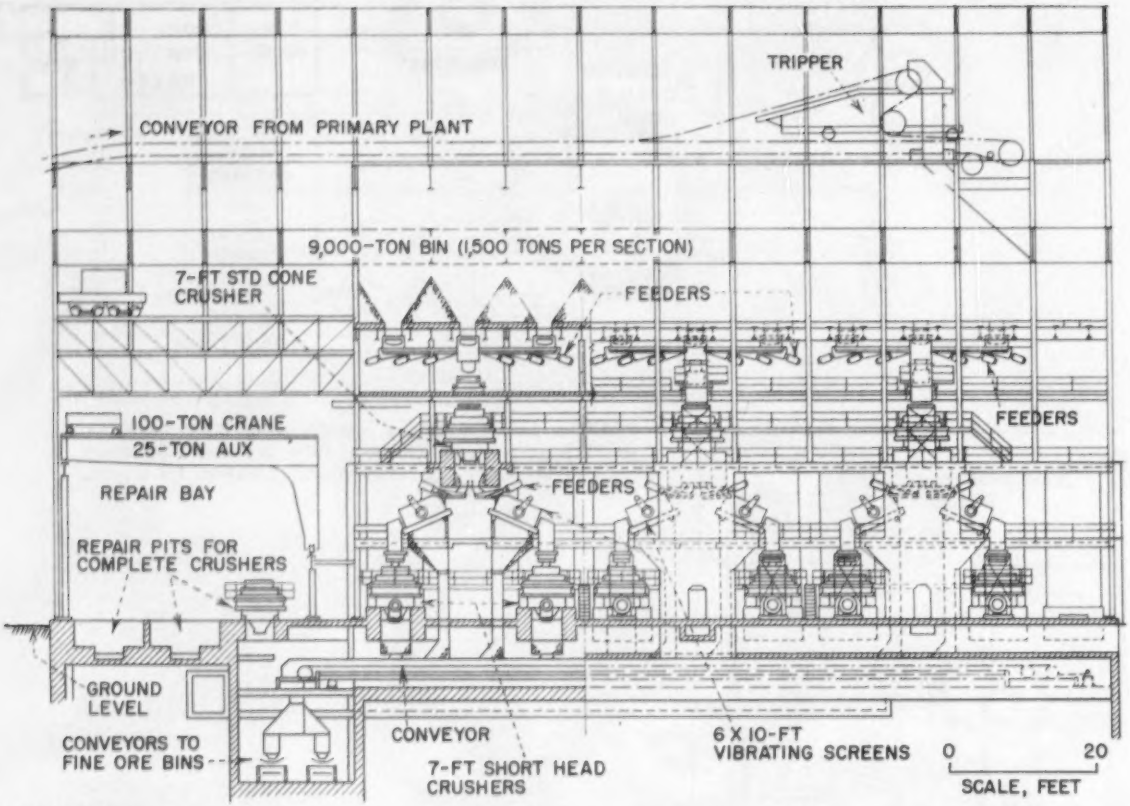
PRIMARY crushing plant uses 2-stage reduction to minus 5 in. Note dust enclosure for car dumper and air-conditioned control room.



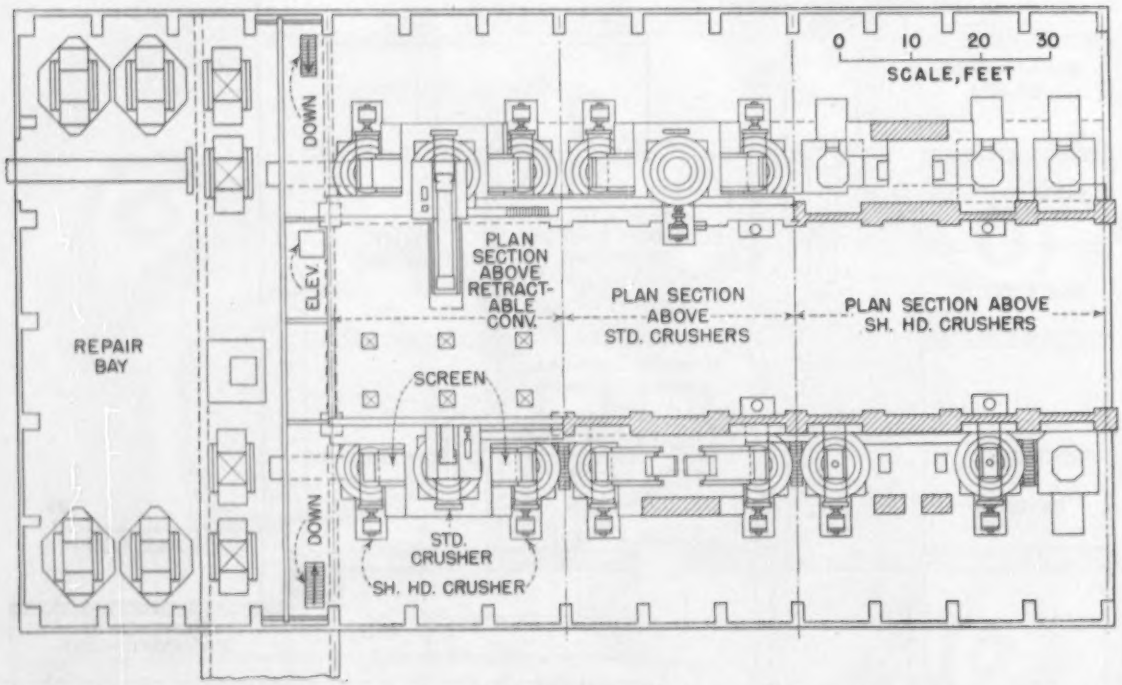
PLAN at ground level (see opposite page) shows layout of second stage. Rock will pile up to form feed chutes. Big crane can pull out a 36-in. gyratory crusher complete, for repairs.



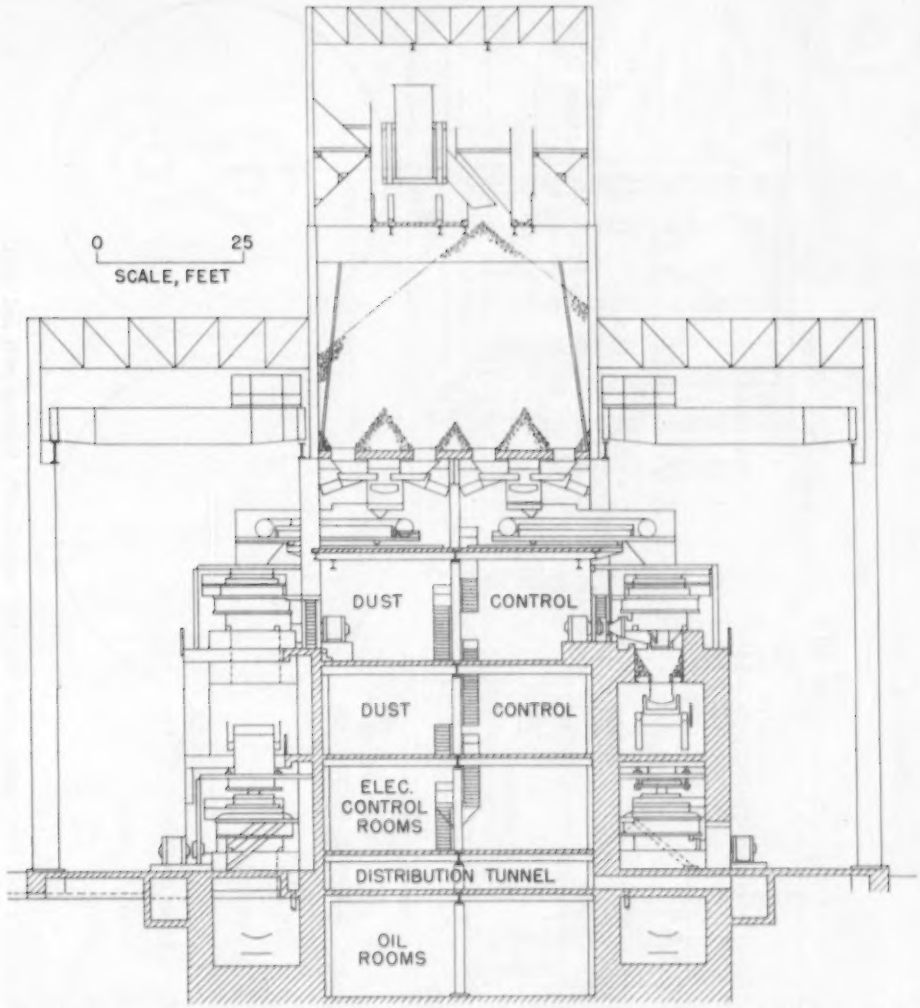
DUMPING of 80-long-ton cars is by hydraulic arm, under precise control (car doors open under control, too), rather than by rotary dumper. This is based on experience at Morenci and Chuquicamata plants, both (like Erie's plant) designed by Anaconda's engineering staff.



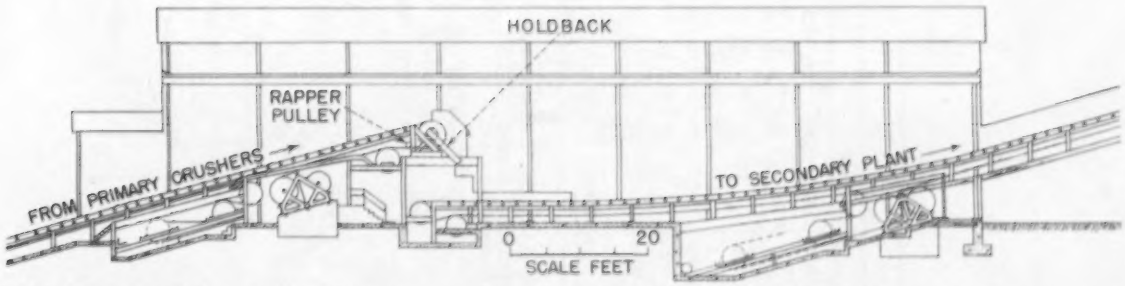
SECONDARY crushing plant uses Standard and Short-head cones to reduce 5-in. feed to about minus ¾ in. Note gantry-type construction on 100-ton repair bay crane so other cranes can lift complete crushers over into repair bay for relining.



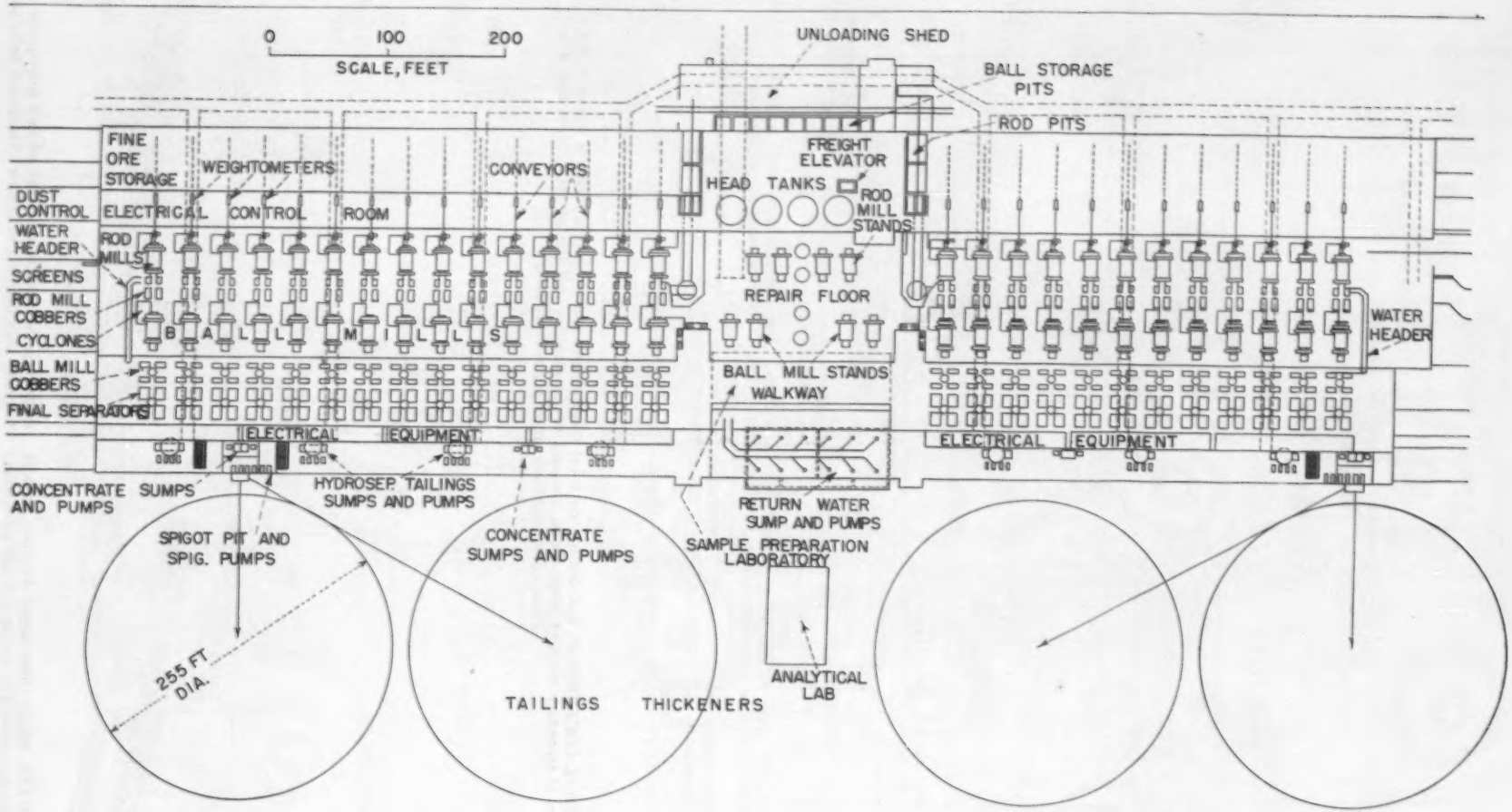
PLAN of secondary crushing plant. Bin capacity will be kept low to minimize trouble with frozen ore. Vibrating feeders will draw bins down evenly, keep them empty in spring and fall. Abrasive ore will probably entail frequent relining jobs.



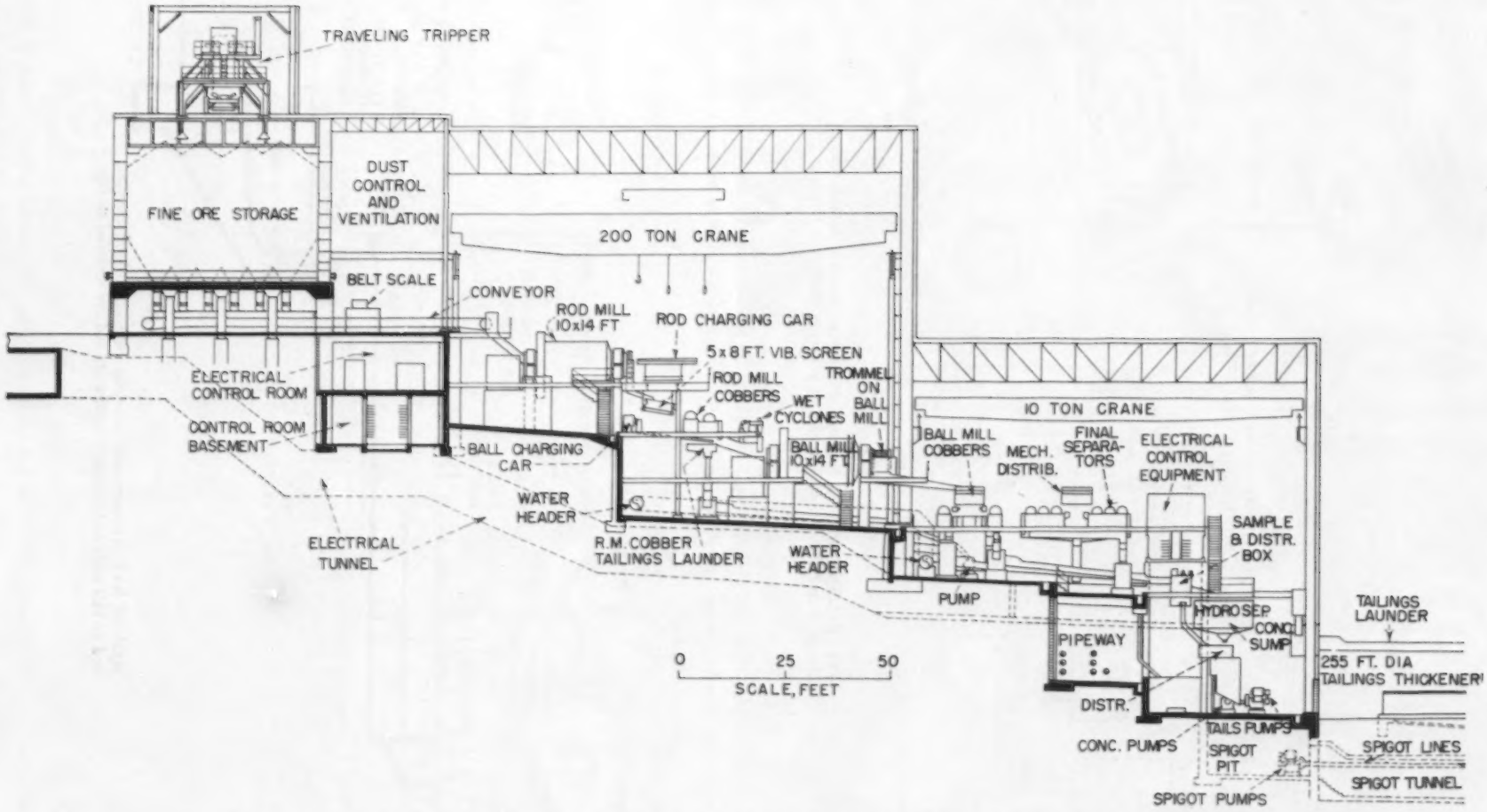
CENTRAL LOCATION of dust control, electrical control units, and oil storage rooms is shown in this section of secondary crushing plant. Clean, compact design disguises real size of plant. Note that it is about same height as eight or ten story building.



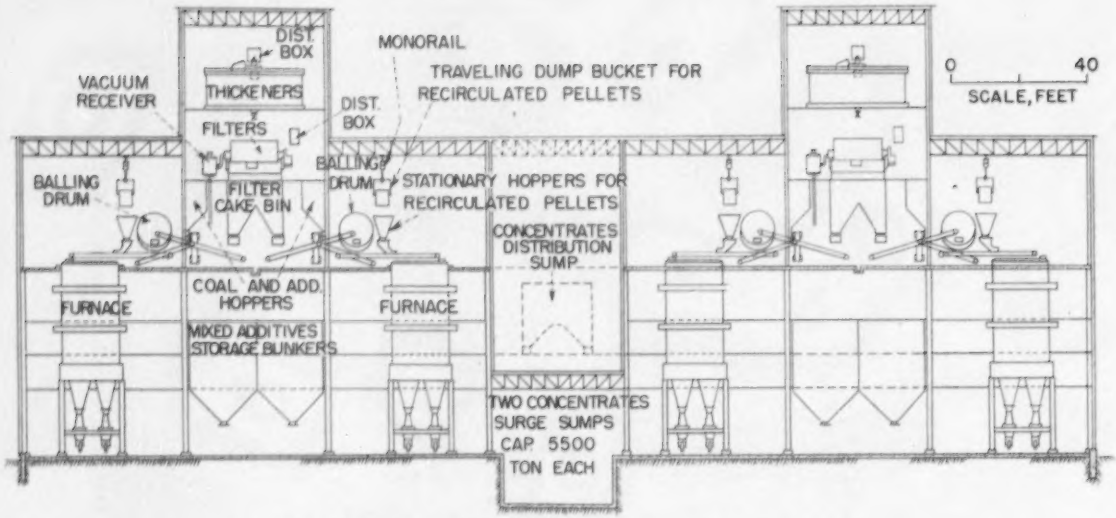
CONVEYOR DRIVES are in drive house between primary and secondary crushing plants. This makes it possible to extend belts on either end to take care of new primary or secondary capacity that may be built later. These are both 60-in. belts.



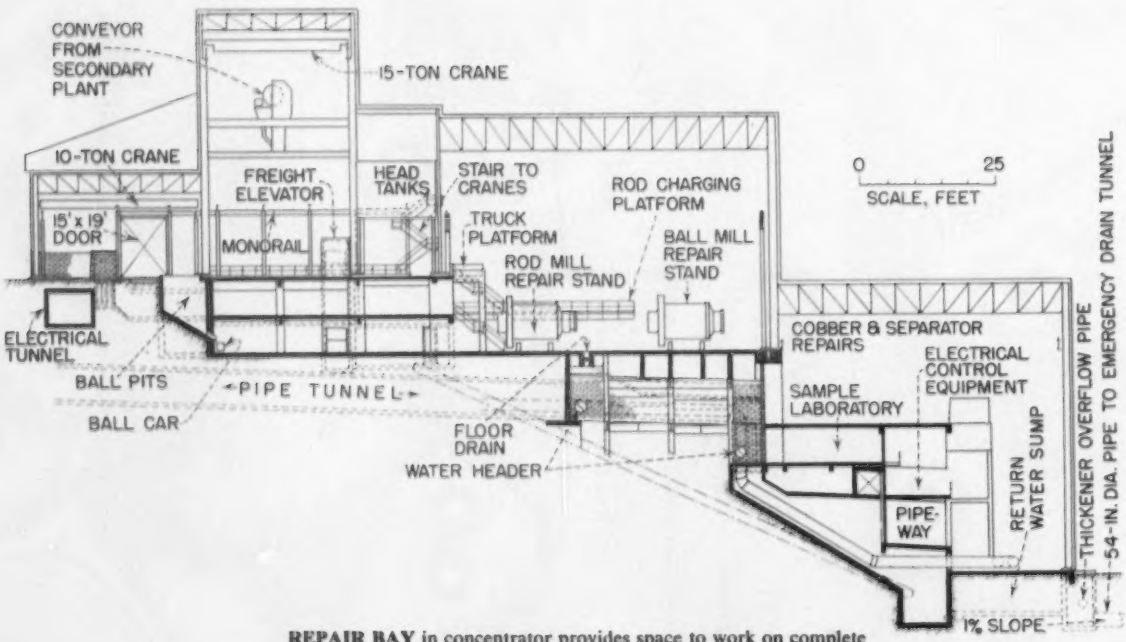
CONCENTRATOR is largest yet built initially in single unit. Note special repair bay and way of easily handling rods and balls.



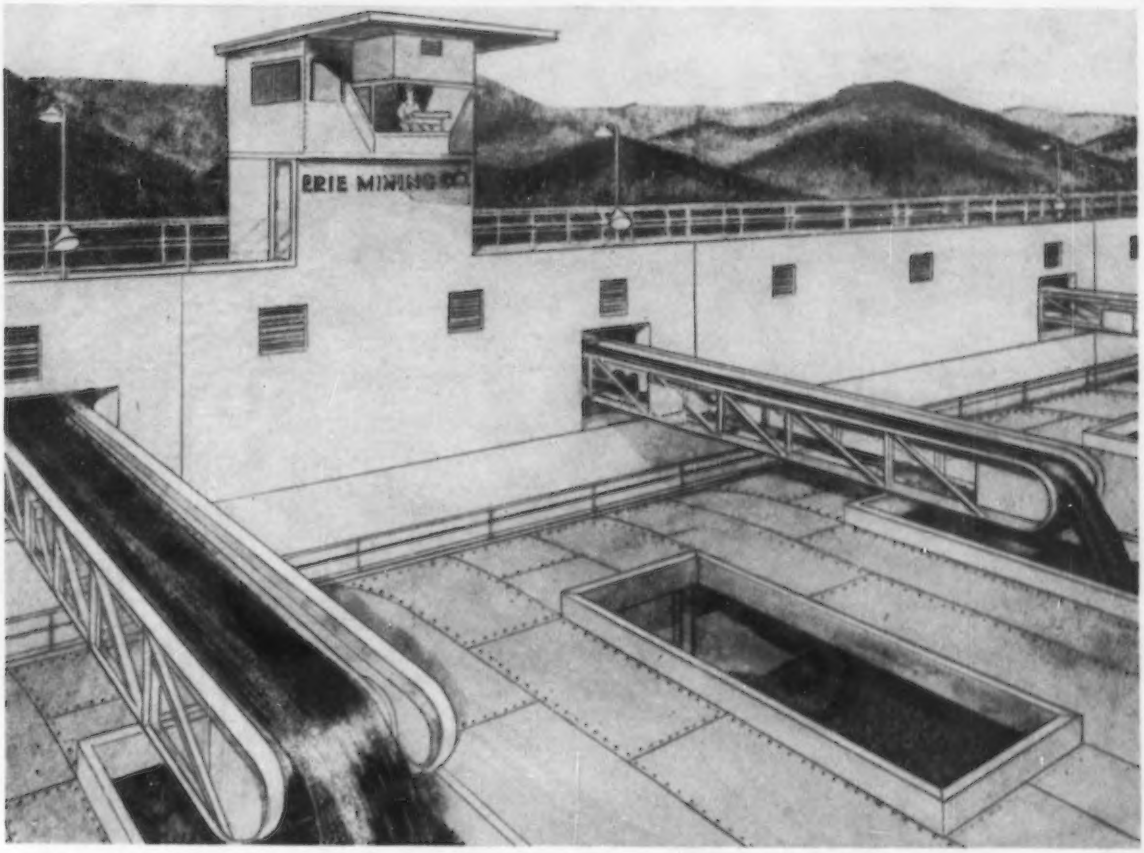
IN SECTION, note use of cyclones instead of classifiers with ball mills, also centralized controls, pipeways, and charging cars.



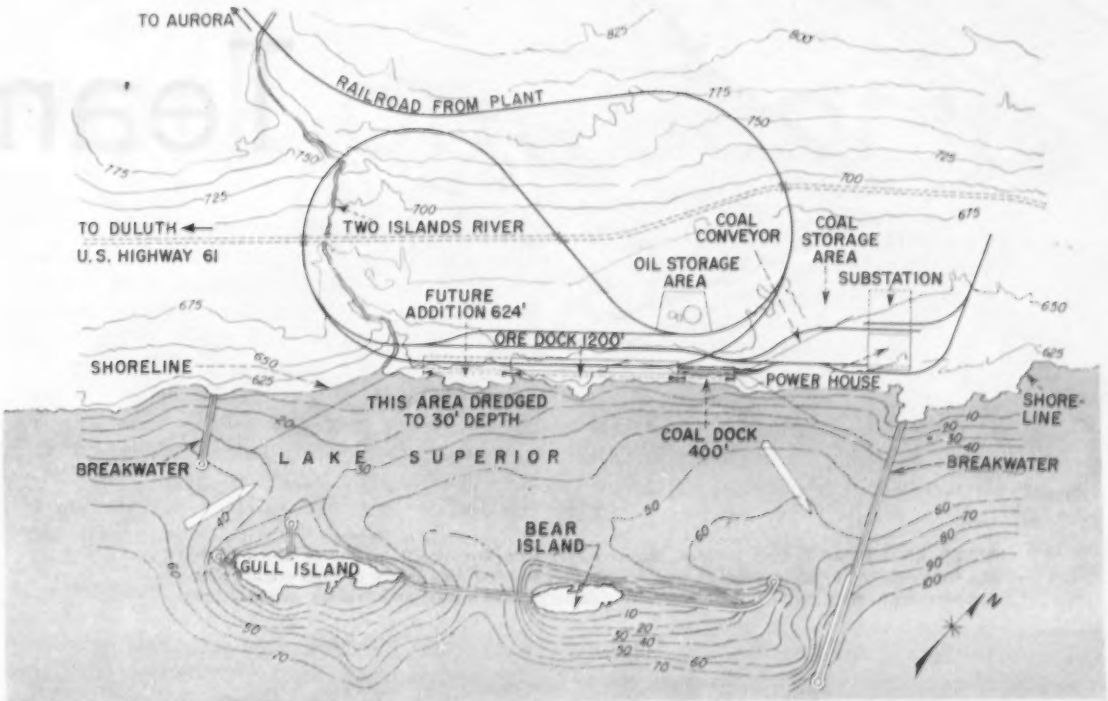
PELLETIZING PLANT includes thickening, filtering, mixing of charge, then balling and hardening of pellets in shaft-type furnaces.



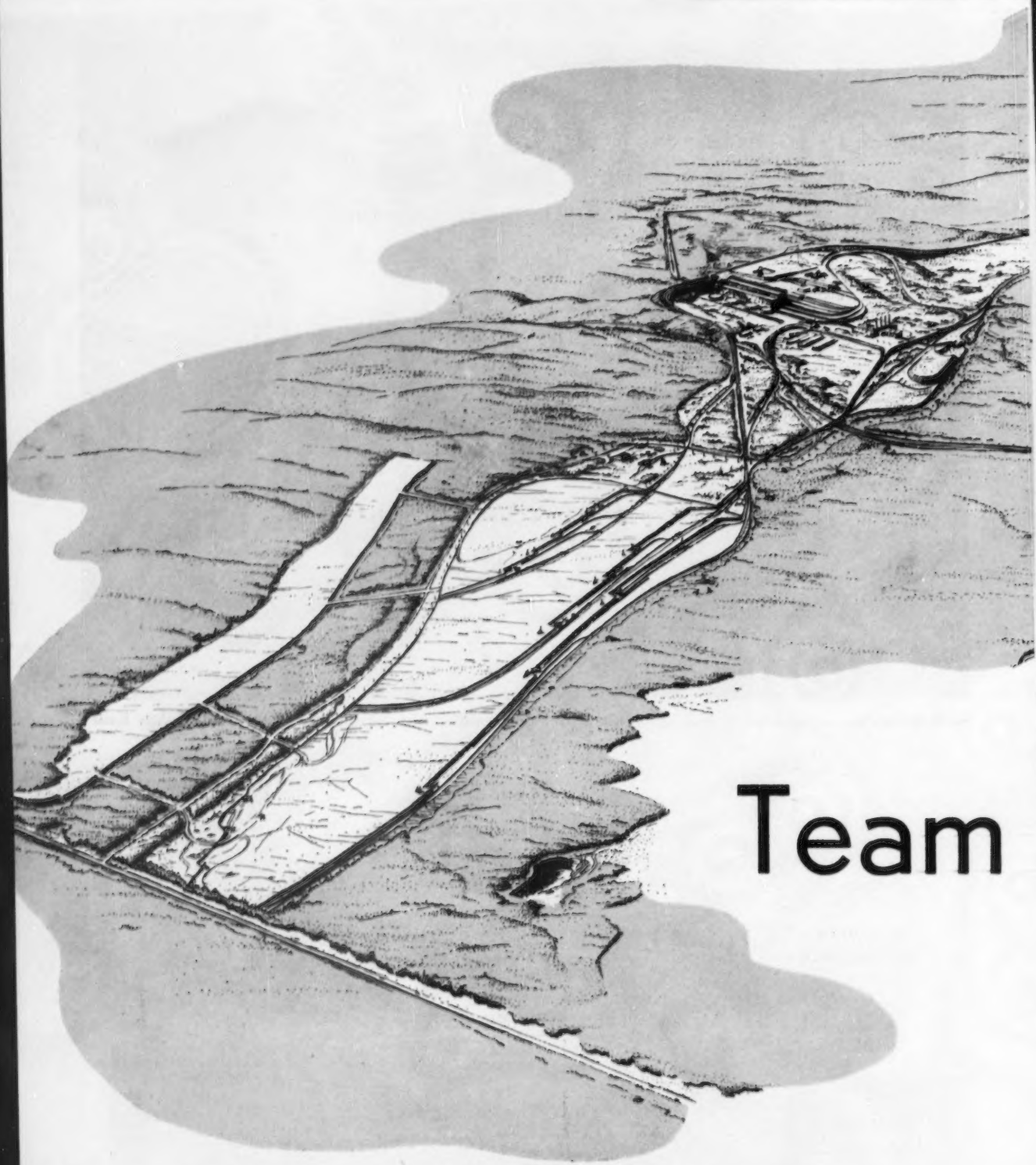
REPAIR BAY in concentrator provides space to work on complete rod or ball mills and magnetic separators and for material storage.



NEW IDEAS for loading pellets at dock will include conveyor belts rather than old-style chutes, thus loading ships faster.

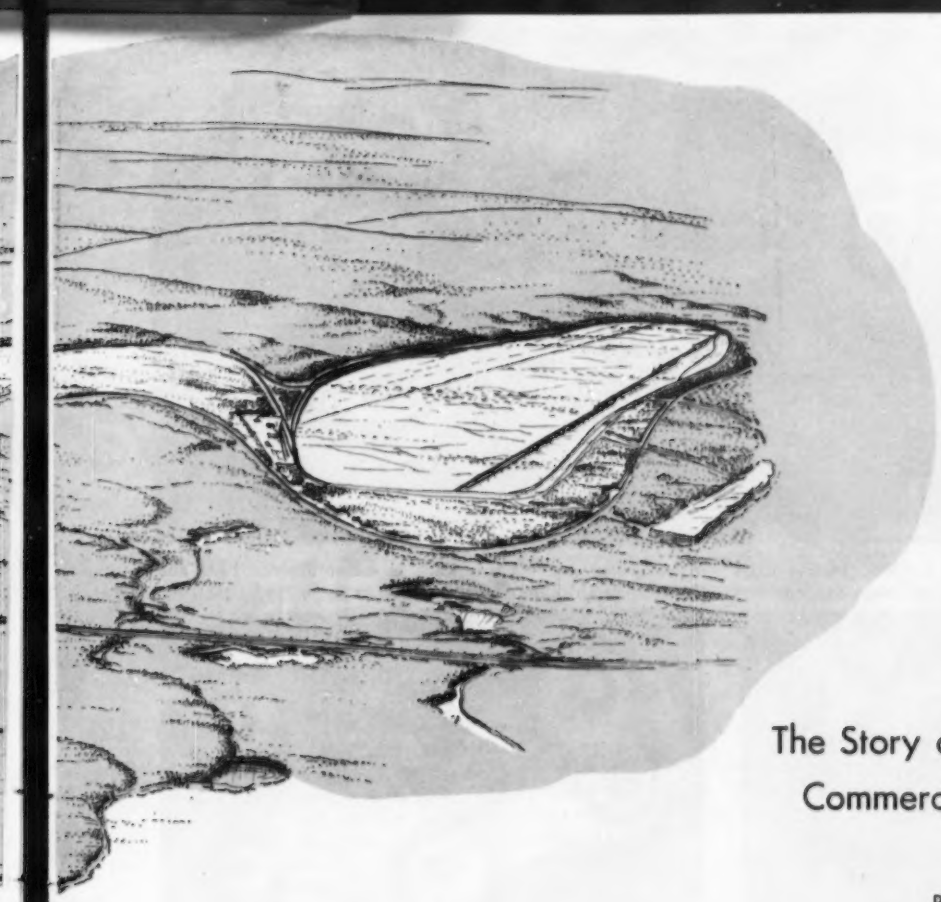


TACONITE HARBOR, showing railroad from plant, ore docks, and straight-line entry, loading, and departure for ore boats.



Team

MINES AND PLANT, near Aurora, Minn., where Erie Mining Co. will mine about 63,000 long tons daily of taconite; from it, produce about 7,500,000 tons yearly of high grade pellets. Compare with map, p. 72, to locate plant (center), two mines, and tailings disposal area.



The Story of Erie Mining Co.'s Commercial Taconite Project

R. H. RAMSEY, New York, N.Y.

work on Taconite

DRIVING QUIETLY BUT POWERFULLY toward their goal of commercial taconite utilization, the men who are doing the job are really the most interesting element of the whole vast $300-million taconite project of Erie Mining Co.

Having said that, one must hasten to add that there will be but little mention of individuals in the following pages. Resolutely shunning publicity rather than seeking it, the men of Pickands Mather & Co., and of the owning companies, who have directed the project from its inception, rightly regard the undertaking as an outstanding example of teamwork.

The ideas and the efforts of hundreds of men have gone into the final job. You will find in reading about it that Erie Mining Co. is mining, milling, processing, and shipping a mineral product on a scale, and against natural and technical obstacles, unmatched in any single mining enterprise yet described in these pages.

Obviously there must have been leadership and there must have been good staff work. There must have been vision, skill, confidence, ingenuity, determination, and courage, brought to bear on this project in the greatest measure.

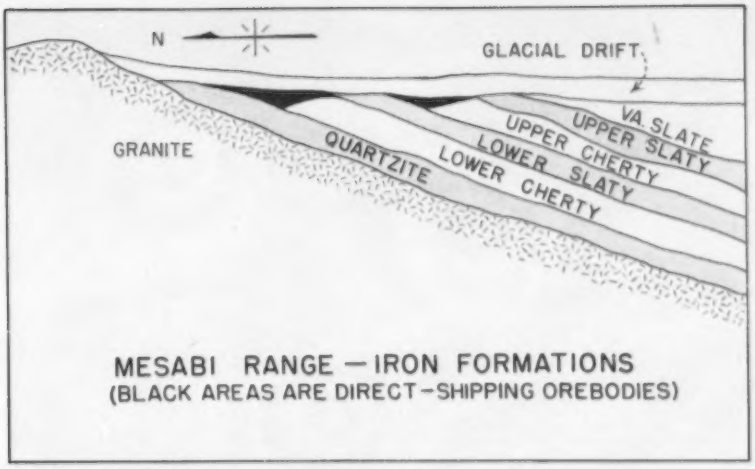
Yet you will not find here a tribute to one man, or even a dozen men. Rather Erie Mining Co.'s taconite project stands as a physical expression of the effective technical skill and managerial teamwork of Pickands Mather & Co., backed by the technical experience and financial courage of Bethlehem Steel Corporation, the Youngstown Sheet and Tube Co., Interlake Iron Corporation, and the Steel Co. of Canada, Ltd.

To attempt to name any one man as responsible for the success of this project would require naming everyone connected with it. Let us credit it, then, to teamwork and to the more than 4,000 men who are doing the job and are proud of their work.

STRIPPING OVERBURDEN is easy for Erie Mining Co.'s shovels and trucks. Real problem begins when taconite has to be drilled and blasted. Rock is extraordinarily hard and abrasive; best drilling method so far seems to be jet piercing.

TYPICAL TERRAIN where two mining areas are being opened up. This is actually a rock cut along the railroad right of way.

JET PIERCING with kerosene-oxygen flame plus steam, cuts "corrugated" hole, requiring pelletized powder for solid loading.



IRON FORMATION and associated rocks lie in this manner near Erie's plantsite. Mines will be opened in Upper and Lower Cherty taconite beds.

TACONITE, THE PARENT-ROCK of the high-grade Mesabi Range orebodies, is the Erie Mining Co.'s raw material. Made up of varying quantities of quartz and iron oxides, carbonates and silicates, the Minnesota taconite is a hard, abrasive, gray-black rock carrying about 30% iron.

It occurs in at least two beds of the so-called Biwabik Iron Formation, a series of Pre-Cambrian sediments of Middle Huronian age found along the southern flank of the Giant's Range granite that marks the crest of the Range.

Dipping at about 8 deg to the southeast, these beds, from the granite upwards, include: the Pokegama quartzite footwall, the Lower Cherty, the Lower Slaty, the Upper Cherty, and the Upper Slaty. Above these beds of the iron formation lies the hanging wall Virginia slate. Thickness of the iron formation varies between 340 and 800 ft. See the accompanying sketch for this cross section.

The Erie plant rests solidly on a knob of this underlying granite at the highest point of the Range for miles around. One pit is being opened up in the Lower Cherty bed, and the other pit lies in the Upper Cherty. (See map p. 72).

As the sketch indicates, high grade iron orebodies were formed in the iron formation, probably by action of ground waters. The silica must have been leached out gradually, leaving a spongy porous mass of high grade iron oxides in portions of these beds. It is these orebodies that supplied the bulk of the Mesabi Range tonnage for so many years. Their gradual depletion forces the move on into the low grade taconite source-rock.

Problems of Concentration

The chief problems involved in the concentration of Mesabi magnetic taconites are those of fine grinding the extremely hard rock and of the efficient concentration of the economic iron bearing mineral—magnetite. The ore is hard and has average compressive crushing strength of 55,000 lb per sq in. Some waste material can be discarded after grinding to ⅛-in., but the iron bearing mineral itself is not liberated until it is finer than 100 mesh.

The mineral magnetite represents from 65 to 70% of the total iron content of the magnetic taconites. The other iron minerals present are siliceous carbonates, iron silicates, and minor amounts of hematite. With the exception of the minor amount of hematite, the recovery of the other iron minerals is neither possible nor desirable because of their silica content. The waste product from the plant will contain the unrecoverable iron content together with gangue minerals which consist largely of quartz, greenalite, Minnesotaite, and stilpnomelane.

There is a great difference in the concentrating characteristics of the taconite from the four beds indicated in the iron formation sketch. The iron and gangue minerals vary considerably in these four beds and the degree of liberation also varies. The special characteristics of the four beds follow:

1. The Lower Cherty rock can be treated successfully by magnetic separation when ground to minus 100 mesh, which means about 75% minus 325 mesh.

2. The Lower Slaty bed is extremely fine-grained, and currently there is no known way of economically recovering the iron content. Not even a 500-mesh grind will liberate the iron ore particles.

3. The Upper Cherty bed resembles the Lower Cherty, except that a finer grind is required.

4. The Upper Slaty resembles the Lower Slaty in that it has no present commercial value, owing to its extremely fine-grained characteristics.

How Much is Magnetic?

About 25 years ago, most Range geologists believed that the Duluth gabbro had altered the iron formation's hematite to magnetite, which accounted for the high content of magnetic iron in the taconite of the east end of the Range. The general belief was that the magnetic iron content decreased sharply west of the line between ranges 13 and 14 West.

In the sketch map of the Aurora area shown on p. 72, the line between ranges 13 and 14 West would cross vertically at about the center of the words "Taconite Harbor" along the railroad in the upper right portion of the map.

This line is the western limit of the holdings of Reserve Mining Co., which is now also engaged in a large taconite mining and processing enterprise.

Actually, the town of Mountain Iron, on the Range, is a kind of dividing point. Eastward, the content of magnetic iron increases; westward, the magnetic content decreases, although the total iron content is about the same, roughly 30%.

Everyone interested in taconite is now running tests on the non-magnetic variety. Magnetic roasting, followed by magnetic separation, seems to give most promise at present, but the tonnages of magnetic taconite available are so vast that the problem of non-magnetic taconites is not likely to become acute for many years.

Jackling Came First

The first work on taconite treatment was done by the old Mesabi Iron Co., largely through the inspiration and initiative of D. C. Jackling. In 1924, the Mesabi Iron Co. (note the townsite on the map, p. 72) was actually mining taconite, treating it by magnetic separation, and agglomerating the concentrate by sintering.

There was nothing basically wrong with the company's methods. The venture failed simply because it came too soon. Technology had not advanced far enough to permit low-cost solutions to the problems of drilling the hard taconite, grinding it fine enough

PLANT SITE, as it looked recently. Compare with architect's drawing on p. 71 to check locations. Site of huge (63,000-ton) concentrator is at left foreground; pellet storage is to right; tailings will be pumped to a dam in the area in upper left.

to liberate the iron, and agglomerating the concentrate.

Erie Mining Co. will do essentially what Mesabi Iron did in 1924, but modern methods have brought great technical contributions which have reduced costs to within economic limits.

P M Becomes Interested

Pickands Mather & Co. first become interested in other than direct-shipping ores in 1931. The firm realized that the inroads on high-grade reserves made by World War I and by the growth of the country's manufacturing industries would require turning to lower-grade ores in the forseeable future.

In 1931, P M & Co. went to Bethlehem Steel Co. and the Youngstown Sheet and Tube Co., and the three entered into a program to study the use of low-grade ores. It was then thought that magnetic taconite stopped at about the western side of Range 14 West, so rather than work with taconite, a means was sought to concentrate the so-called lean ores, which were found generally in the lower parts of the direct-shipping deposits.

It did not take long to determine that there was not enough "lean ore" available to make the long-term reserve position secure. The group therefore turned to the study of taconites and began the acquisition of lands north of Aurora. Drilling rapidly disclosed that the magnetic content was high.

The Mines Experiment Station at Minneapolis confirmed these findings.

EXCAVATING foundations for concentrator grinding and separating units (shown in Dec. 1954) is mining job in itself. Work is expected to be complete by middle of 1955.

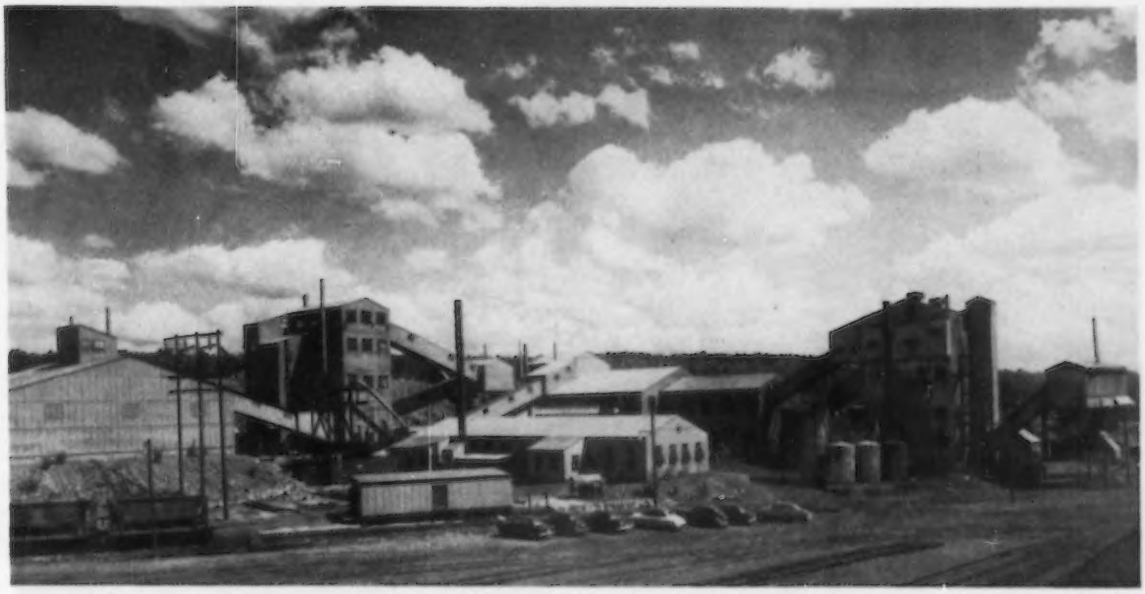
The group then launched an exploration campaign that covered the Mesabi Range from Aurora to Nashwauk. During 1938 and 1939 many thousands of feet of diamond drilling were done. This turned up enough magnetic taconite to cause the company to suggest the formation of a new company that would have the specific purpose of developing taconite and finding means of making it commercially usable.

How P M Operates

As a result, Erie Mining Company was formed in 1940.

To understand the background of Erie, one must examine the structure of P M itself.

P M operates about 25 mines, both underground and open-pit. They are the only operators with mines on all the Lake Superior ranges. They ship about 10-million to 15-million tons of



IN PRELIMINARY PLANT, begun in fall of 1947 and run ever since, Erie's metallurgists developed grinding, classification, separation, and pelletizing techniques for full-scale plant. Output to date totals about 570,000 tons of pellets.

POURING foundations is a small part of tremendous job. Taconite Contracting Corp. has been set up to coordinate letting all the contracts required for project.

iron ore per year. They have been in business for 73 years.

P M is a partnership. Its activities are extremely diversified; aside from the ore mining operations, it manages the Interlake Steamship Company (second largest fleet of Great Lakes bulk carriers), and has important activities in coal mining and sales, pig iron sales, ore handling, and related fields.

Most of the mining companies which P M operates are owned by others; the four companies that own Erie are major stockholders in other P M-operated mines, although a number of other companies have interests in some of the mines.

When Erie was formed, P M continued to manage the program. P M relinquished part of its one-third share to the Dalton Ore Company, which was owned by Interlake Iron Corporation and P M, and the rest to Youngstown and to the Bethlehem Steel Co.

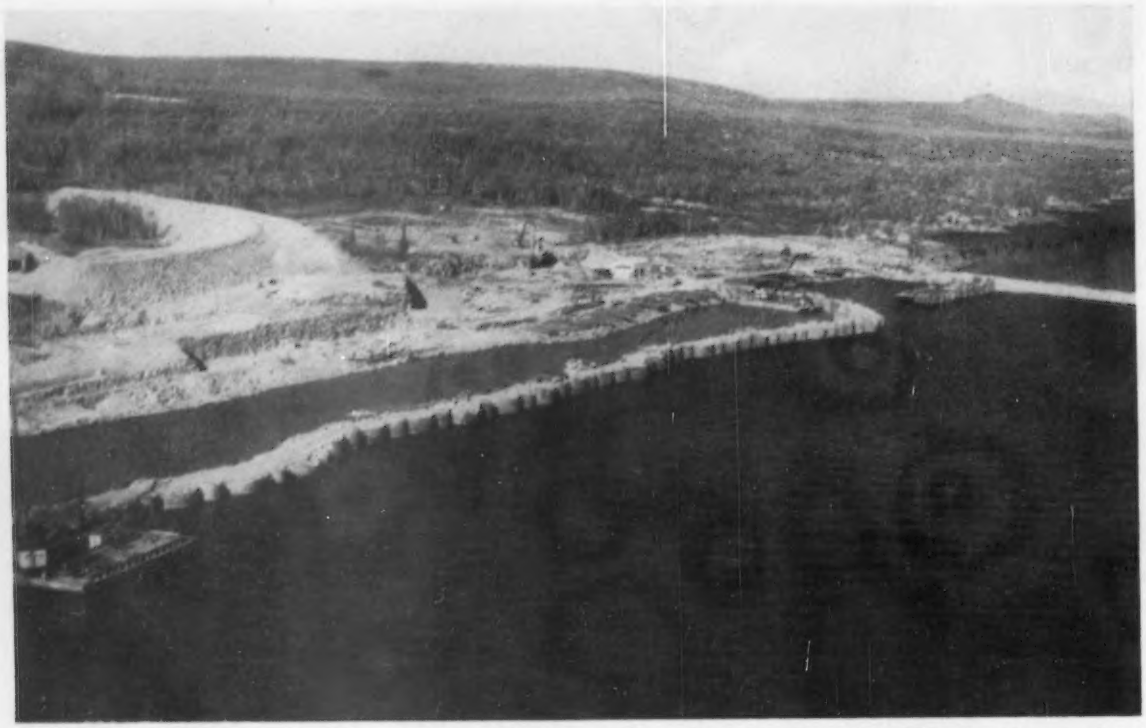
Later on, Interlake acquired complete control of Dalton, and a 10% interest in Erie was sold by Youngstown to Stelco Coal Co., a subsidiary of Steel Company of Canada. This brought the owners of Erie into their present alignment: Bethlehem (45%), Youngstown (35%), Interlake Iron (10%), and Stelco (10%).

Great Legislative Step

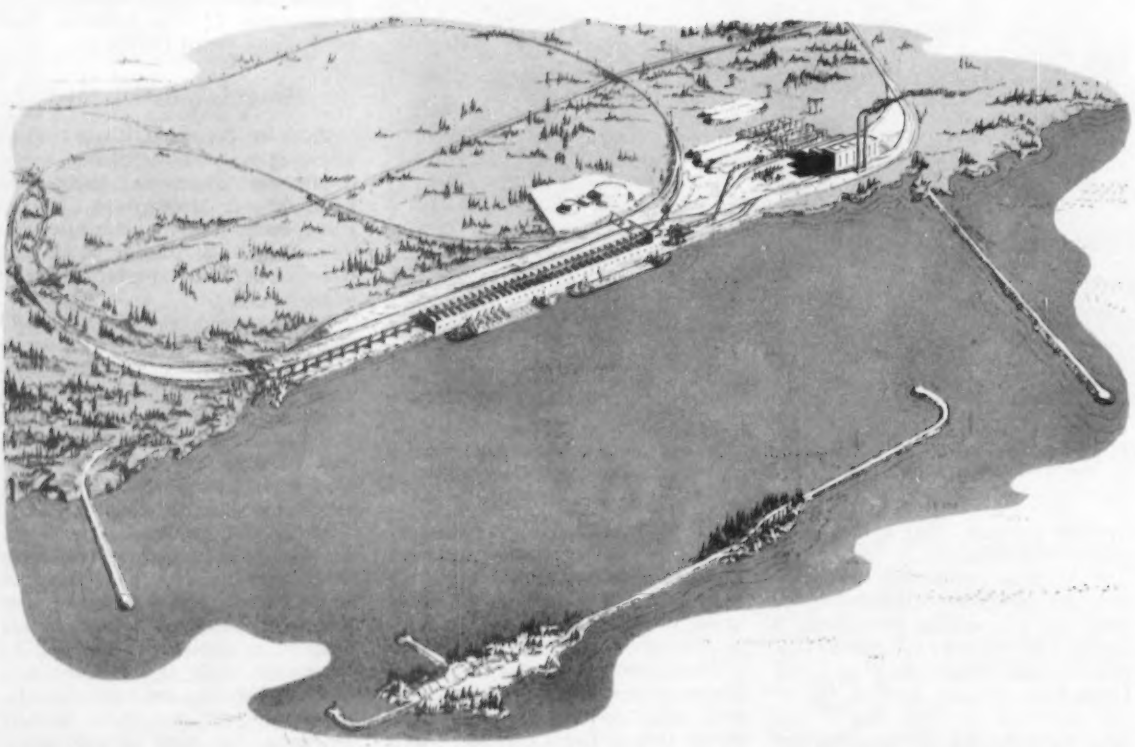
From the beginning, it was obvious that cost was the controlling factor in taconite utilization. High costs killed the old Mesabi Iron Co., and costs, under the tax structure that existed in 1940, would choke any taconite operation, however efficient it might be.

It was apparent that the tax schedules applied to ordinary high grade iron ore reserves became prohibitive when applied to taconite. To support a taconite operation, huge reserves would have to be blocked out. If these were taxed as ore as soon as developed, and at existing rates, no company could stand the cost.

At the 1941 session of the Minnesota legislature, representatives from Range districts and the League of Range Municipalities presented new tax bills that radically revised the tax structure as applied to taconite. To the eternal credit of this legislature, a suitable bill was passed unanimously, and the greatest barrier to taconite utilization was thus cleared away. Professor E. W. Davis, then with the University of Minnesota Mines Ex-



TACONITE HARBOR, showing coffer dam being built out around water-front area that will have to be excavated to depth required for ship-loading. This dam is one of two that Dravo Corp. will have to build to do complete job.



TACONITE HARBOR, as it will look when completed, with ships loading at new-type dock, and breakwater construction complete. Note how ships can enter protected area from lower left, load at dock, leave again at right without turns.

RAILROAD from plant curves down past dock site, crossing present highway from Duluth. Railway layout here makes possible ingenious method of unloading ore, loading coal and oil for plant, and returning to plant with minimum delays.

periment Station, played an important role in this vital development, as he had for many years earlier.

Therefore, taconite was to be taxed on a production basis only. It would not, like other iron ores, be taxed in the ground. As a corollary, the 1941 legislature revised existing lease terms in regard to royalties on state-owned lands, bringing them down to more reasonable figures.

Encouraged by this step, Erie obtained many state and private leases on taconite lands, where it was possible to block out large tonnages for mining.

Note on the map, p. 72, how the two areas indicated for mining dwarf the several direct-shipping mining areas formerly worked nearby. Taconite mining calls for moving three times as much ore for an equivalent tonnage of product. Neither the Range, nor any other mining district, has seen anything like the operations now being established there.

Erie's Laboratory

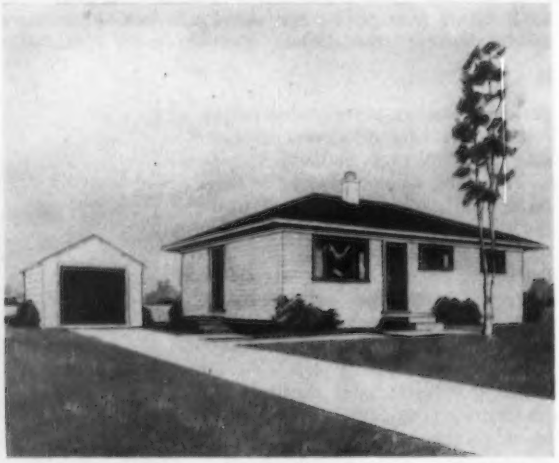
In 1942, a laboratory was set up in Hibbing for the express purpose of finding a way to treat taconite commercially, and it has run continuously ever since.

The initial objective was to develop a concentration and agglomeration technique. The first work was done with

INSIDE COFFER DAM, after it was completed, pumped out, and rock work begun. Aim was to simplify drilling, blasting, and loading for harbor excavation and dock.

TOWNSITE takes shape. When complete, town will have around 3,000 houses of two- and three-bedroom types. The shopping center is already laid out and built. Conventional construction is used. John W. Galbreath & Co. is handling job.

STAFF HOUSES will look like this. About 3% of town's houses will be of this type, built for permanent staff.



TYPICAL three-bedroom house, which makes up about 87% of town's houses, is varied widely in color and style.

flotation, and a successful flotation method for iron oxides was worked out and patented. It appeared, however, that cost would be prohibitive, and work thereafter was done on magnetic separation.

Recovery Is High

Hundreds of tests were run in which ore samples were ground to various sizes and treated in the Davis magnetic tube tester. As already noted, it appeared that a possible recovery of 95% of the magnetic iron content in the form of a 64% iron concentrate could be made with a 100-mesh grind.

A long series of grinding tests on the taconite showed that there was no substantial release of iron ore particles until the rock had been crushed to about 8-mesh in size. For that reason, a flowsheet was worked out to include rod mill crushing from about 5% on ¾-in. to about 1 or 2% on 8-mesh. Magnetic separators are to be used as cobbers on this rod mill discharge.

If separation were attempted at a coarser size, the value of the iron lost in the coarse tailing would exceed the cost of crushing to 8-mesh. About 35% of the plant feed is to be discarded as tailing at this point.

Further laboratory work on grinding developed the possibility of using cyclones, instead of mechanical classifiers, to close the ball mill grinding circuits. A water saving, economy of space, and a cleaner separation are said to be obtainable. This practice is being adopted also by Reserve's new taconite plant.

Separation Improved

Lengthy work with magnetic separators in the Erie laboratory resulted in what is believed to have been the first use of permanent magnets in drum-type separators. Erie's work in

this line has resulted in greatly simplified practice. Electro-magnetic separators will be used for the rod mill cobbers, where some variation in strength may be desired. The other separators (ball mill, cobbers and finishing separators), will be of the permanent magnet type.

Along with work on concentration, tests were run endlessly on agglomeration. These included work on sintering, nodulizing, and pelletizing in every conceivable manner. For example, the staff was interested in work done with a shaft-type of furnace at the University of Minnesota. It gave promise, although tests showed a heat requirement of about 2-million Btu per ton of product.

Along in 1945, the P M staff tried the idea of heat recuperation, using the finished pellets themselves as a kind of pebble-stove heat exchanger for the incoming air. Two furnaces were used, run in parallel, in a batch operation. The pellets produced were hard enough, but the operation was difficult to handle.

Then the idea developed of placing one furnace atop the other for easier operation and heat conservation. A 30-in. furnace of this type ran for months in the Hibbing laboratory. It produced excellent pellets, and eventually got the heat requirement down to about 300,000 Btu per ton of product.

Erie's Preliminary Plant

Finally in the fall of 1946, work had gone far enough so that Erie authorized a preliminary plant to produce high grade pellets from taconite at the rate of 200,000 tons annually. This plant had commercial-sized units in every respect, except for the primary crusher. Its objective was to find out exactly how equipment would behave and to determine optimum techniques on the actual material at hand.

The preliminary plant was ready to start on July 1, 1948. Everyone on the plant staff remembers that date well. It marked the beginning of one of the liveliest periods in their lives, because not everything in the preliminary plant worked out exactly as it had in the laboratory.

For example, steel cloth had worked well as a filter medium in the laboratory, but in the plant it choked up repeatedly and wouldn't hold a cake. Nylon cloth now does this job well.

In the preliminary plant, a full-size pelletizing furnace was built. It is 11 ft in diameter and 60 ft high, incorporating the arrangement developed in the laboratory. As was expected, operating an 11-ft furnace is quite different from operating a 30-in. furnace, and several changes had to be made and new control methods devised.

A rectangular furnace was finally developed instead of the circular one originally used. A device designed to break up clinkers works better with the rectangular-shaped furnace, and a rectangular furnace is easier to feed with wet balls.

Many of the details of charging, firing, and controlling the pelletizing furnaces cannot yet be described, but certainly there has been worked out in the Erie preliminary plant one of the most interesting and effective metallurgical processes in use anywhere.

Briefly, the concentrate from the mill is thickened and filtered, bringing the moisture content to about 10%. Powdered coal and a binding additive, like bentonite, are mixed with the concentrate, and balls are formed in a balling drum.

These balls are fed carefully to the shaft-type furnaces, where the temperature in the combustion chambers is brought, by oil burners, up to about 1800 deg F. The temperature in the shaft itself reaches about 2,350 deg F by reason of the exothermic reaction as magnetite changes to hematite in the pellets.

This temperature must be carefully controlled, because if it goes as high as 2,450 deg, serious fusion results and troubles develop. Precise control is quite possible in the shaft furnace, and the long treatment at the right temperature, Erie knows, produces a satisfactory pellet.

Mining Tested, Too

Along with the preliminary plant work, tests of mining equipment were run as the taconite for the plant was mined nearby. (For location of plant, see map, p. 72).)

Thus far, only two special problems have been encountered: drilling the taconite, and loading the holes. Both appear to have been solved satisfactorily.

Although tests of other methods are constantly being run, jet piercing seems to have solved the drilling problem for the present.

In this method, kerosene is burned with oxygen in a blow-pipe that rotates against the rock face in such a way that a water jet following the flame jet spalls off heated rock fragments and the resultant steam formed blows them out of the hole thus broken.

Conventional churn drills have been able to put down about 12 ft per shift of 9-in. hole in the taconite. The jet rigs do an average of about 15 ft per hr of 6½-in. hole.

Oxygen comes to the jet piercing drill as gaseous O_2 under pressure. Tests have shown that the purity of the oxygen can be reduced without difficulty to the point where an 88 to 90% O_2 is being used.

The problem of loading the hole arises from the fact that the jet piercer bores a hole 6½-in. in diameter minimum. Due to variations in the rock, however, the hole may be a maximum of 12 in. in certain parts which gives an average diameter generally of 9 in. (See photo.) Because of these varying diameters optimum blasting results would be lost if only cartridge powder could be used.

After extensive tests, the staff is currently using a free-running pellet powder that effectively fills the uneven spaces and takes full advantage of the hole's diameter.

When operating at the rated capacity of 7.5-million tons of pellets yearly requiring 22,500,000 tons of raw taconite, the mines will use 11 jet piercing rigs. Plans currently call for opening the two pits in 40-ft benches. Hole spacing will probably be about 20 ft, but all the factors involved in drilling and blasting will be subject to change as the work progresses and no definite figures can be given at present.

Ore will be loaded by 11 electric shovels, most of them 6 yd in dipper capacity. Ore will be hauled by diesel-electric locomotives to the primary crushing plant in trains of side-dump, 80-ton cars.

Length of haul should average about two miles. The pits will be quite long, as compared with the ordinary open pit. For example, the Lower Cherty pit will be about 4 mi long overall. The pits will be relatively shallow, however, the maximum depth being about 125 ft.

New Plant is Largest

The preliminary plant at Aurora began operating in mid-1948, and up to mid-1952 was the only taconite plant in existence using commercial-sized units. As of Jan. 1, 1955, this plant produced approximately 570,000 long tons of pellets averaging about 62% Fe, plus 277,000 tons of concentrates.

The pellets were delivered to Erie's stockholders and were tested by them in blast furnace and open hearths. These tests showed that taconite pellets made a high grade, commercially satisfactory furnace feed.

On Dec. 4, 1953, Elton Hoyt 2nd, president of Erie Mining Co., and senior partner of Pickands Mather & Co., announced completion of plans to finance the final construction project that will result in production of 7.5-million tons of pellets yearly.

Eventually the project may be expanded to produce 10.5-million tons annually.

It should be noted that neither in the present program, nor in the planned expansion, will there be invested a cent of U. S. Government funds. The Defense Production Administration has awarded Erie a certificate of necessity covering the project on a basis of up to 10.5-million tons annual production. There has been no other action by the Government in connection with the project.

Erie has arranged to sell $207-million of first mortgage 4¼% bonds, due in 1983, to a group of nine insurance companies and Bethlehem Steel Corp. Substantial equity capital has also been subscribed by Erie's four stockholders. Up to the time the commercial plant construction was started, Erie had spent more than $15-million on exploration, process development, and preliminary plant construction and operation.

The commercial plant, described in this article, will be the largest concentrator ever built as a single initial unit. Capacity is rated at 63,000 long tons of taconite ore daily (or about 70,000 short tons per day).

Because the proposed plant would be the largest of its kind, and because of the special problems involved, the Erie officials sought the services of an engineering staff that possessed considerable experience with plant design on the largest scale.

Following negotiations with the management of Anaconda Copper Mining Co., an agreement was reached whereby the Erie plant design would be handled by Anaconda's engineering department which has designed and built plants at Andes Copper, Chuquicamata, Cananea, Yerington, and for Phelps-Dodge at Morenci and Ajo. The prime contractor is Foley Constructors of Minnesota.

All of the plant drawings shown on foregoing pages are simplified versions of Anaconda's design.

Features of Design

Out of the approximately 8,000 drawings required to detail the Erie plant, the few included with this article give a general idea of the main features of the plant's design. Beginning with the primary crusher, here are some of the more noteworthy elements.

Car-dumping at the primary crusher is by stationary hydraulically-actuated arms rather than by rotary dumper. This shift from former practice on installations this large is based on recent experience at Chuqui. Dumping in the new way is smoother and better controlled. Cars are to hold 40 cu yd, or about 80 long tons.

The operator will sit in an air-conditioned control room, from which he can see both car-dumping, which he controls, and the crusher mouth. He also controls a crane for clearing jams in the gyratory.

Dust control resembles the system at Chuquicamata. The whole crusher pocket is enclosed to make dust collection more effective. Ore storage space is eliminated to prevent trouble with freezing ore.

Second-stage crushers (four 36-in. gyratories) are set in a semi-circle for ease in feeding. No special feeding arrangements are provided because the ore itself will pile up to provide distributing chutes. The 200-ton crane can lift out a complete gyratory for lining or repair. The 60-in. gyratory, however, will have to be relined in place, because a 300-ton crane would have had to be provided to lift out even the upper half.

A hydraulic jack, placed under the 60-in. gyratory, handles the crusher eccentric. This is in line with the designer's preference for side-discharge rather than bottom discharge gyratories.

The conveyor between the coarse and fine crushing plants (60-in. belt) consists of two belts in tandem, driven by motors in a drive house midway between the plants. This permits expansion on either end without shifting drive motors.

The fine crushing plant, reducing the ore from 5-in. to about ¾-in. in size, is an improved version of Anaconda-designed plants in operation elsewhere. It uses standard and short-head cone crushers with intermediate screening. Vibrating feeders draw ore down evenly in the fine crushing plant bins.

Rod and ball mill circuits resemble Chuqui's sulphide ore plant, except that cyclones are used instead of mechanical classifiers. (See flowsheet.) Rod, ball, and liner wear are expected to be high, therefore extra precautions have been taken to insure easy handling of these items. (Note drawings of concentrator.) Rod mills take 800 hp; ball mills, 1,250 hp.

Both tailings and concentrates will be pumped away from the mill. Tailings, after thickening, go over the edge of the hill to Morenci-type tailings dam. Concentrates go to thickeners and filters at the top of the pelletizing building, an unusual feature.

Water requirement for the plant may run as high as 75,000 gpm. An automatic discharge arrangement provides that in the event of power failure, the resulting overflow will simply pass through a 1500-ft tunnel to the tailings pond, and not flood floors in the plant.

Other aspects of the plant and the process are shown in the flowsheet and the legend at the head of this article. The final product is a hard pellet, about ⅝-in. to 1½-in. in size, and having about the following analysis:

Iron	64%
Silica	7.5%
Phosphorus	0.01%

Fractional amounts of manganese, alumina, lime, and magnesia

Power and Water

To supply power for the project, a power plant is being built at Taconite Harbor, the shipping point for the pellets, 73 mi by rail from the plant-site. The steam boiler and turbo-generator combination will have a capac-1,000 deg F and 1,450 lb pressure.

The plant will use the most modern equipment available, hydrogen-cooled generators, for example, and steam at 1,000 deg F and 1,450 lb pressure.

The plant is located on Lake Superior to make sure of an adequate supply of cooling water.

Electric power will go up to the plant at 138,000 v (about 6 mi on the power line), where it will be stepped down to 13,800 for distribution in the pits and the plant. Design of the plant and power line is also done by Anaconda.

After exploring several possible water sources, the company turned to Colby and Whitewater Lakes (see map, p. 72). Colby Lake is 30 ft higher than Whitewater. Building two dams will raise Whitewater Lake 30 ft and provide sufficient reservoir capacity to run the plant. When the plant is operating, water will be pumped out of Whitewater's reservoir into Colby Lake, and out of Colby Lake to the plant. Water for the new town of Hoyt Lakes will also come out of Colby Lake. All of the water which will be used in the process will be spring floodwater, with no depletion of the permanent supply.

Railroad to Harbor

Operating the railroad that will haul the pellets to Lake Superior will be cheaper for Erie Mining Co. than it would be to use a commercial carrier.

For one thing, only one product is

carried, which eliminates need for maintaining a complete ore grading operation. There is only one owner and one destination. There will be no problem of stickiness or freezing; the pellets are fast-dumping.

The 100-car trains will traverse a wilderness for the most part on the way to Taconite Harbor. Of the line's 73 mi, 16 are on muskeg, which Erie is crossing by using a dragline to cut down through the muskeg and replacing it with gravel fill. Engineering of the railroad is being done by Erie. The subgrade is being done by Arrowhead Constructors.

There is a steady up-grade away from the plant, doing away with jerking on draw-bars. There is a 1,950-ft tunnel approximately 10 mi from the harbor end. There is a 4-deg curve at the plant and a 4 to 6 deg curve at the harbor. Maximum curvature elsewhere is 2 deg, 15 min.

Track will be of 140-lb rail, 24 ties to a section, laid over stone ballast over washed gravel sub-grade. Cars will hold 85 long tons, and will use 36-in. roller bearing wheels instead of the regular 33-in. Brakes will have two shoes to provide triple the braking force for loaded trains. Tight-lock couplings will be used.

For a 100-car train, locomotives will have 1,750 hp. Four or five diesel units will be provided. Train top speeds will be 45 mph loaded and 55 mph empty.

Harbor track arrangement eliminates need for switching there, although 10 cars of coal and 6 cars of fuel oil must go up to the plant each day. Study of the track layout will show how oil and coal cars can simply be dropped by one train at their respective sidings and picked up full by the next train. The rail line will be kept open only through the Lake shipping season.

Harbor and Dock

To provide all-weather loading for ore boats along the north shore of Lake Superior, breakwaters had to be built. Yet the steeply-sloping rocky shore generally reached a depth of 300 ft only about 1300 ft out from the water line.

P M's engineers sought a break in this pattern and found it approximately 75 mi north of Duluth at what is now known as Taconite Harbor, a point where two islands, Gull and Bear, thrust above water at about the right distance from shore. Using these islands as bases, the Frederick Snare Corp. designed a harbor as shown in the accompanying photographs.

Prevailing winds come from NE, hence the breakwater to the northeast out to water 100 ft deep. Boats will enter from the south, tie up at the dock, and leave, after loading, out through the northeast exit headed straight for Sault Ste. Marie.

The ore dock will be approximately 1800 ft long; the coal dock, 400 ft long. Coal for the project will be brought in by boat. The coal tower's capacity is approximately 1300 tons per hr. A belt runs out to the coal storage area.

Note in the section of drawings the unusual nature of the ore dock, itself. Instead of the conventional chute arrangement, the Erie dock will use traveling belt conveyors, drawing ore by positive feed from the storage bin on the dock, and delivering it under precise control to the ships' holds. These 42-in. belts are 48 ft apart to correspond to the ore boats' hatch spacing.

The dock has a storage capacity of 100,000 tons of pellets. Four electric pocket-droppers will meet every train, and it is expected that the hundred 85-ton cars in a train can be unloaded in 38 min.

Two control towers will be built first; one to control 13 belts and the other to control the next 12. A third may be added later.

Belt speeds will be either 500 fpm (1500 long tons per hr) or 250 fpm, used for getting a vertical discharge trajectory to load the boat's inboard side.

Being a third of a mile long, the dock will be supplied with a 5-passenger car running the length of it, and at one end an elevator equivalent to that of a 9-story building will be installed. The harbor itself is about a mile long.

At the waterfront, the rock face has to be sliced back to give a vertical face to a depth of 30 ft below low water mark. Instead of doing this by drilling and blasting from barges, Dravo Corp., the contractor, is handling the job by building a coffer dam as shown in the photographs.

The coffer dam is simply a string of 50-ft diameter sheet piling cells driven into the lake bottom through 4 or 5 ft of sand and gravel fill. These cells, interconnected, are filled with gravel, and make a kind of roadway as well as a dam. When the dam is complete, the water is pumped out and excavation proceeds easily. Target date for harbor completion is August 1956.

Town of Hoyt Lakes

Not the least of the job is construction of a new town of about 1200 houses with an expected eventual population of 4,000-5,000 people, with all shopping, sanitary, and administrative facilities. Known as Hoyt Lakes (for P M's senior partner), the new town is taking shape as a model village.

Residents of Hoyt Lakes will be largely the employees of the plant and the mining operations. Construction workers are housed in trailer camps at the plantsite and at Taconite harbor. Incidentally, Erie will find itself the owner of many well-equipped trailers when the job is finished, if you're thinking of buying some.

Embodying about 20 to 30 variations in style and color, the houses of Hoyt Lakes will resemble roughly the two designs shown in these pages. About 200 were built in 1954. More will be built as needed. Housing is handled by John W. Galbreath & Co. of Columbus, Ohio.

Of conventional construction, the houses include oil hot-air heat, electric hot water heaters, laundry tubs, steel kitchen cabinets, and garbage disposal units.

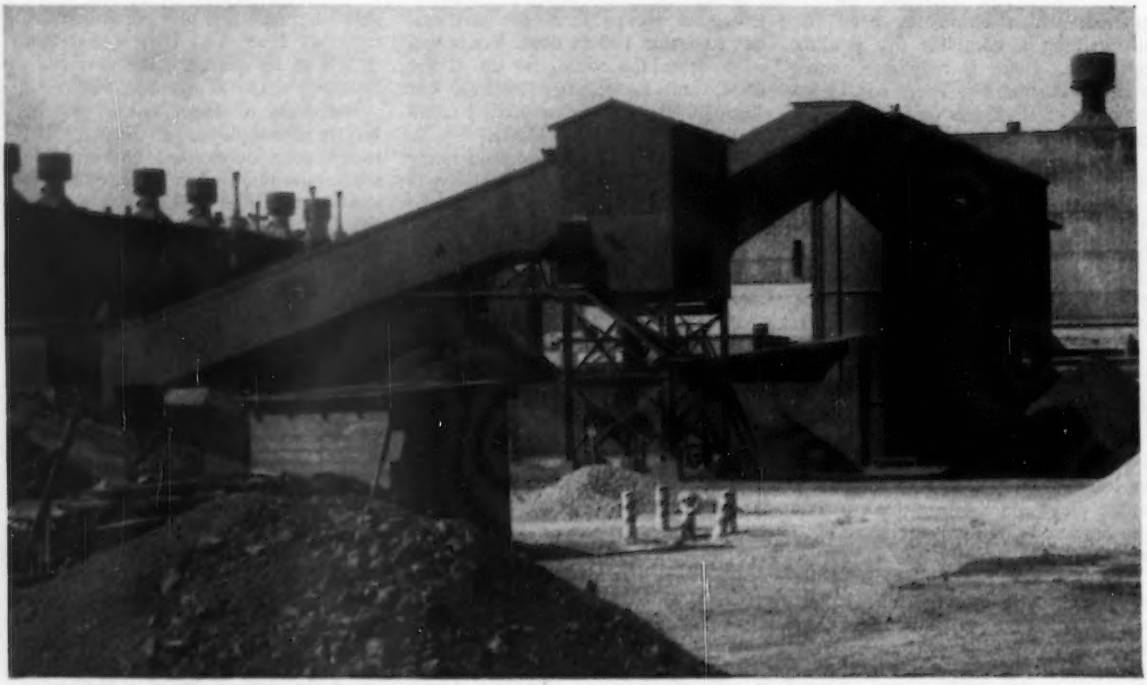
At present, buses take school children to Aurora, but schools will be provided in Hoyt Lakes by the school district starting with the Fall term of 1955. In a few years the town should be nearing its full size.

Careful Planning Pays

The company has worked out a marvelously clear and up-to-date means of keeping track of the dozens of construction jobs involved in the whole project. Nerve center of this control job is a small room up at the plantsite, which is papered with charts recording progress. Preparation and maintenance of these charts is a story in management all by itself.

Some idea of the scale of this privately financed project can be gained from the simple statement that when it is completed, it will consume a 40-ton railroad carload of raw material every minute of every hour of every working day. That the heads of these companies should have committed themselves to such a large expenditure is a great tribute to their faith, as well as to the vitality of the free enterprise system.

It is a vast undertaking, but a well-planned and an extraordinarily smooth-running one. Nowhere in traveling about the job does one get a feeling of strain or serious concern over the outcome. These men are sure-handed and they know their jobs. The planning that began back in 1931, and that was carefully worked out every step of the way, is now paying off. Teamwork began the Erie project, and when the plant begins production sometime in 1957, teamwork will have been responsible.



MATERIALS PROPORTIONING BUILDING (right) contains storage bins of 200-ton capacity. Raw material is conveyed from pile at left through transfer tower (center) to bins on traveling tripper. Dust recovery unit (stack) is in background.

Automatic Furnace Charging

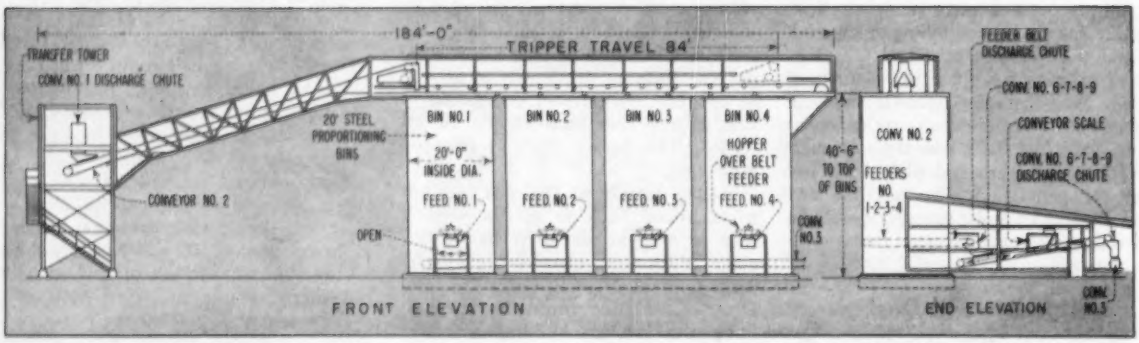


FIG. 1. Removal of material is by feeder belts at bottom of each bin, which drop it onto weight belt. Feed is constant.

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IN ELECTRIC FURNACE OPERATION, control of furnace metallurgy starts with the proper proportioning of the furnace charge. The purpose of the apparatus described in the article was to furnish a process control system designed to maintain continuous process equilibrium to a high degree of accuracy. To provide maximum effectiveness, the furnace feed proportioning system had to be accurate and reliable, as well as relatively inexpensive and simple in design.

In the smelting plant of Pioche Manganese Co., Henderson, Nev., there are available for the production of ferromanganese two Lectromelt carbon-lined, 6-electrode (in straight line), 7500-kva furnaces. It was desired to proportion the furnace charge consisting of manganese nodules, coke, flux, and manganese ore, each stored in separate bins, continuously and automatically for delivery to bins above the furnaces, whence it is dropped by gravity into each furnace as required. At times furnace slag replaces ore or nodules.

Arrangement and layout of the proportioning building are shown in Fig. 1. The raw materials are stored in bins, each capable of holding about 200 tons, and removal is effected by feeder belts at the bottom of each bin.

PIOCHE MANGANESE CO. needed control instrumentation for regulation of feed for these two carbon-lined, 6-electrode (in straight line), 7500-kva Lectromelt furnaces. Charge consists of manganese nodules, flux, coke and manganese ore.

These are powered by U. S. Varidrive motors equipped with electrical speed change motors for varying the speed of the feeder belt from a remote location. From the feeder belt the raw material is dropped onto a weigh belt discharging onto the common mixing belt leading to the electric furnace bins. On the weigh belts the materials are continuously weighed, and the rate of feed is kept constant through the control mechanism by varying speed of the feeder belts.

For top accuracy, many weighing devices were studied before a selection was made. The scales finally chosen were F-M conveyor belt scales, chiefly because of their simplicity, high accuracy, and sturdiness. The F-M scale is essentially a precision spring balance which is motor-driven, providing continuous balance. Weigh belt section of the conveyor belt is connected to a balance arm, to which is fastened a precise measuring spring. On the balance arm tip are electrical contacts. A pair of vertical shafts carry the integrating disc and electrical contacts mounted on a movable frame. These contacts make and break circuits with the contacts on the tip of the balance arm. The contacts on the integrating disc frame are connected to a reversing electric motor which raises or lowers the framework to maintain continuous balance of the integrating disc without loading the scale beam in the slightest amount.

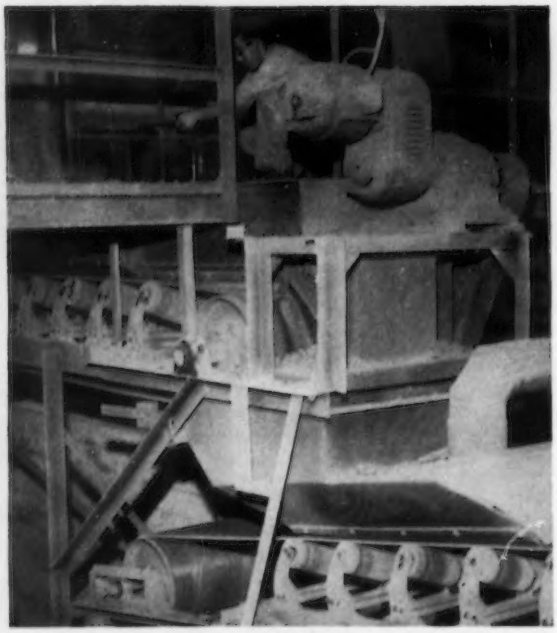
An inverted cone, set at an angle to place one side in a vertical position, is rotated through a gear transmission driven directly from the traction roller on the belt. The integrating disc in contact with the cone is mounted on a vertical keyed shaft, and its vertical movement is controlled by the small reversible motor energized through the electrical contacts from the tip of the scale beam. With the belt empty the tip of the beam is at equilibrium between the contact points, and the integrating disc is at its lowest point on the cone. As the loaded belt passes over the supported belt idlers, the balance beam rises and when making contact at the tip energizes the motor which raises the integrating disc to a higher point on the surface of the cone. As the beam balances out the load on the conveyor belt, the contact is broken, stopping the motor and leaving the integrating disc at this position until the load is again increased or decreased on the conveyor belt.

It is thus seen that the position of the integrating disc on the surface of the cone is a measure of the rate at which material is flowing on the belt, provided the speed of the belt is constant. A change in the position of the integrating disc is a measure of the change in the weight of feed on the belt. Since the position of the integrating disc is a measure of the rate at which material is being conveyed on the belt and since the integrating disc framework is motor positioned, it is obvious that this framework may be loaded with external devices without affecting the accuracy of the scales in any way.

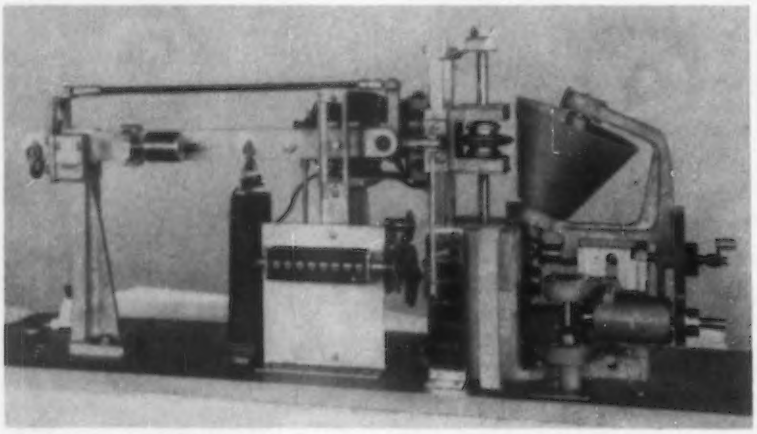
In view of the desire to use conventional pneumatic instruments to measure the feed rate, it was obvious that some means had to be found for converting the position of the integrating disc to a pneumatic signal. This was accomplished by using a Moore Valve Positioner in an inverted manner to make it into a motion transmitter. The unit is a precise instrument normally used for positioning a valve stem accurately and in direct proportion to the pressure applied to the valve positioner, and only a few simple alterations were required for use as a motion transmitter. It was connected to the integrating disc framework in a manner so that when the load on the belt was zero a pneumatic signal was transmitted to the control instrument that was 3 psi, and when the load on the belt was 100% of the designed rate for the scales, the pressure transmitted then was 15 psi. Other belt loads result in pressures directly proportional to the load. When used in this manner, the Moore positioner is a precise means of converting the feed rate on the belt into an accurate pneumatic signal for transmittal to the control instrument.

Control instruments selected for this

FIG. 2. Don Oviatt makes routine scale inspection. Note Moore motion transmitter, connected by rod to the frame.



MORLEN HILBURN (at top) adjust feeder gate on the coke bin. U. S. Varidrive feeder motor is in the foreground.



CLOSEUP OF THE SCALE shows inverted cone, set at angle, and rotated through gear transmission driven from belt roller.

application are Brown Instrument Co. pneumatic recording controllers with full throttler control and manual reset. They put out a corrective pneumatic signal proportional to the deviation of the pen from the control index which may be set at any point on the scale. Thus, the controller may be made to control at almost any point between zero and 100% load on the belt. Fig. 2 shows placement of scale.

Since the device to be controlled was the U. S. Varidrive motor equipped with electrical positioning motor, mentioned previously, it is obvious that the pneumatic signal had to be reconverted into an electrical signal. This was accomplished by taking the pneumatic signal from the recording controllers to Minneapolis-Honeywell proportioning Pressuretrols. The electric signal created by the Pressuretrol is then taken to an electronic controller of our own design. This unit causes impulses of electrical energy to be sent to the positioning motor of the Varidrive feeder motor. The impulses in turn will cause the Varidrive motor to speed or slow down as required. If the deviation of the load on the belt from the set point is small, then electrical impulses are infrequent and of short duration. As the deviation of the scales from the set point increases, the impulses then become more frequent and their duration becomes longer. Thus, the correction of the feed from the bin to the weigh belt is proportional to the deviation from the desired set point. The greater the deviation, the greater the corrective change. Adjustments on the electric controllers permit them to cover a wide variety of conditions.

It is interesting to note that since this control system was designed and constructed, U. S. Electric Co. has developed a pneumatic means of varying the speed of the Varidrive motors. If this development had been available at the time the system was designed then use of electronic controllers would have been unnecessary as it would have been possible to go directly from the pneumatic controller to the electric motor to control the speed of the feeder belt. Another unique and useful feature of the controller system is in the application of the "Adjustable Indexit." In essence, the entire control problem is one of controlling the ratios of the different feeds at all times. The actual rate at which the material is conveyed to the furnace bin is not important so long as the ratio of ore to coke, ore to nodules, and ore to flux is maintained with precision. It was for this reason that the Adjustable Indexit was incorporated in the design. The unit, devised by the Brown Instrument Co., positions the control indexes of several instruments from a master instrument. Here is how it works.

Let us assume that it is desired to convey ore at the rate of 40 tph and

that the correct amount of coke to be conveyed with this ore is 10 tph. Let us assume that the gate of the ore belt becomes partially blocked and that only 20 tph passes over the belt scales. For this amount of ore only 5 tons of coke are required. The Adjustable Indexit automatically sets the rate for the coke feeder to 5 tph. In a similar manner the nodule feeder and the flux feeder are adjusted to the new conditions determined by the master unit. Thus, the feed rate on the master belt controls the feed rate of all other belts.

The Adjustable Indexit also has other useful features. If the operator wishes to change the rate at which the material is being conveyed to the furnace bins, he merely needs to change the set point (control index) of the master instrument to a new position, and all of the others will automatically adjust to the master as it automatically adjusts and maintains the proper ratios. In addition to giving an indication of the rate of feed on the belts the F-M scales also give an integration of the weight of material passing over the belts at all times. The indicated weight of material is transferred mechanically to the integrating system, a feature which assures the utmost accuracy under all conditions. The position of the integrating disc on the surface of the cone determines the number of revolutions of the disc, which are at all times in true ratio to the load on the belt. The integrating disc and cone are gear-connected to a mechanical differential, the output of which is connected to a Veeder-Root counter, setting up a record of all material passing over the scale-supported section of the belt conveyor.

The combination of the integrating cone driven directly from the belt friction idler and the positive positioning action of the balancing electric motor on the integrating disc, both operating into the mechanical differential, provides one of the most positive and accurate means available for totalizing the weight of materials on conveyor belts. Thus, accurate means are available for knowing the actual tonnages conveyed on each of the belts for every charge.

Operation of the System

Each of the control instruments has a chart, calibrated zero to 100 regardless of the range of the belt scales. The scales are periodically checked for accuracy by placing a string of weigh carts on the belts. Various calibrated weights are available for placing on the carts to give different weights per ft of belt. Prior to the test run various weights per ft of belt are loaded on the carts and the conveyors set in motion. During each ½-hr test run, both the scale reading of the control instruments and the integrated weight are noted. From these readings a scale factor for the conveyor scales is computed and a chart factor for the rate of feed over the scales is taken from the chart of the controlled instrument. By using various weights per ft of belt the linearity of the control instrument can be checked. With this information it is possible to determine what the setting of each of the control instruments should be for a given number of tph to be conveyed.

Chart Conversion

The metallurgist responsible for calculating the furnace charge calculates the charge in the conventional manner, followed by converting the tonnages into chart readings for the control instruments. The chart settings are then given to the laborer responsible for the operation of the system.

The master instrument is equipped with a special pneumatic relay which allows a calibrating or setting signal to be injected into this instrument. This signal does not come from the scales but from a separate variable air source. The operator injects the calibrating signal into the master instrument by merely pressing a switch. Then by means of a control knob he adjusts the air pressure signal to the master instrument until he obtains the setting on the chart for the master belt given him by the metallurgist. Through electrical interlocks the conveyor belt cannot be started so long as the calibrating signal is being injected into the master instrument. After the settings have been made on all instruments, the operator throws the switch and removes the calibrating signal from the master instrument, automatically reconnecting it to its scales. The system is then ready for operation.

The system is placed into operation by pressing a single switch which starts all the conveyors and all feeders. The speed-control motors on the Varidrive feeder motors may be operated manually or automatically from the electronic controllers. In general, the operator starts the system on manual control in order to prevent hunting of the control system as it starts up. After a few minutes the scales and controllers quiet down and the system is put on automatic. Thereafter, the feed rates are adjusted automatically. The proportioning system is operated by two men, with one man stationed in the control room watching the instruments and the other operating a belt tripper above the furnace bins. The two electric furnaces served may both produce ferromanganese or one silicomanganese and the other ferromanganese. Each of the furnace bins has a capacity of about 200 tons. The charge is usually proportioned in the morning and again in the afternoon. Total time required for conveying charge for the two furnaces is about 3 hr a day for two men.

Before and after each run of charge the Veeder counters of each of the scales are read to determine the tonnage run over each. These figures are given to the control metallurgist who calculates the actual burden run and compares it with the desired charge. In this manner any errors are discovered and corrective charges can be run into auxiliary bins for mixing with the main charge. Because the maintenance of the proper charge balance is of such critical importance in electric furnace operation, more than unusual care is taken to make sure that the belt scales are operating properly. As a consequence, each scale is calibrated with check weights at least once a week, largely as a precautionary measure.

The system has been in operation about 18 months, and during this period close records have been kept. Maintenance on the system has been exceptionally low. To date only one of the electronic controllers has failed, chiefly because of excessive heat in the control room (summer months). There are four electronic controllers, each employing five electron tubes. Only three of latter have failed since start of operations. The proportioning building is very dusty because of the dry materials handled, yet neither the scales nor any of the control apparatus have given appreciable trouble because of dust. Maintenance on the pneumatic instruments has been negligible.

The accuracy of the instruments employed in this application is one-half of 1% of the instrument scale span. The system operates well within these limits. The principles employed in the system should find many applications other than the proportioning of charges for electric furnaces. For example, the Adjustable Indexit system could be used to vary ore, water, and reagents in direct proportion on the grinding circuit in a flotation plant. Another useful development is the use of the Moore Valve Positioner for converting a motion into a pneumatic signal. Still another is the application of the Pressuretrol and the electronic controller for converting a variable pneumatic signal into electrical impulses, the frequency and duration of which are each proportional to the deviation of the pneumatic signal from a normal condition.

THREE FAMOUS PROSPECTORS MEET at the Colorado Mining Association convention. Left to right, Walter Blair, who discovered the Gunnar Gold uranium property with Albert Zeemel; Viola MacMillan, president of Canadian Prospectors Association, also Cinch Lake Uranium Co.; and Vernon Pick, discoverer and president of the Hidden Splendor operations.

Colorado-Western Mining Meeting

THE NATIONAL WESTERN MINING CONFERENCE, Feb. 3, 4 and 5, sponsored by the Colorado Mining Association and affiliated groups was a record-breaking event. Registration topped the 3,500 mark, with liberal representation from the Western mining states, Canada, and elsewhere—and there's no telling how many extra Denverites and neighbors wandered into the sessions to hear the latest developments in uranium and atomic power.

Of the 106 speakers scheduled for the numerous general and simultaneous sessions, fully two-thirds spoke on uranium, atomic energy, and related subjects. In fact, one observer commented that if the words "uranium, nuclear energy, carnotite, and atomic power" had been stricken from the talks, the convention would have been inarticulate. This is not at all surprising, because the Nation is now passing through the peak phase of the biggest mining boom in its history, and the Colorado Plateau is the focal point of major production and exploration programs.

Despite the jam-packed program of technical and general sessions, often held simultaneously, meetings were filled to the overflow point, with rows of spectators standing along the walls of the session halls. One general session covering the commercial and technical aspects of atomic power was moved from the Shirley-Savoy to the new Mile-High building to accommodate an estimated crowd of 1,250 listeners—perhaps one of the best attended sessions in the history of western mining meetings.

The famous annual Gold-Silver Banquet, always a convention favorite, now has been expanded to the Gold-Silver-Uranium Banquet. As might be expected this event stole the show. Jess Larson, as toastmaster, introduced such famous national speakers and guests as Floyd Odlum, President of Atlas Corp., principal speaker at the banquet, Vernon Pick, Lewis S. Strauss, Chairman of the Atomic Energy Commission, Senator George W. Malone, Mrs. Viola MacMillan, President of the Canadian Prospectors and Developers Association, and Jesse C. Johnson, Director of the Division of Raw Materials, U.S. Atomic Energy Commission. The banquet and other luncheons and social events were all sell-outs.

Odlum Speaks on Uranium

Floyd Odlum fanned the flames of enthusiasm and optimism for uranium miners by estimating that "we will have to be mining per year more than a half million tons of average grade ore prior to the year 1960 in order to furnish the initial inventory of uranium for uranium-fueled power plants that will be in the course of construction by that time. For the new atom powered plants that are built thereafter, as well as to replenish the uranium fuel that is used up in the old plants during operations, the scale of production of ore will have to increase steadily. I expect ore production, for these purposes alone, will have to be close to 1-million tons a year by 1965, and well over 3-million tons a year within three to five years thereafter. The scale of increase thereafter will have to be enormous because most power plants built after 1975 will be uranium fueled.

"Neither do I fear," he continued, "that the price of uranium to the miner will drop when the year 1962 arrives. It is more likely to go up."

John W. W. Landis, Babcock & Wilson Co., Atomic Energy division, presented a stream-lined description and explanation of various types of atomic reactors in his talk, "Industry's Responsibility in the Development of Atomic Energy." A number of the listeners slowed-up a bit in their note taking when the speaker got down to a careful analysis of the workings of an "aqueous homogeneous highly-enriched uranium reactor." This type, he explained, shows great promise in the commercial field because it will operate with a blanket of thorium or U_{238} thereby creating new fissionable materials by the breeder process as power is generated. One problem to face, he added, is the requirement of more shielding for the homogeneous reactor than for the heterogeneous type.

HOMESTAKE'S MANAGER, A. H. Shoemaker, spots a friend as he enters the Shirley-Savoy registration room.

"URANIUM SURE STOLE THE SHOW", quips Sheldon Wimpfen, manager of AEC's Grand Junction Operations, as he puts program back in pocket. Elton Youngberg and Phil Simmons, both AEC staff members, agree.

Reflects Nation's Uranium Boom

Speaking of coolants, Mr. Landis listed sodium, lead, sodium-potassium, and lithium as favorable media because they do not absorb neutrons parasitically during the fission process. Babcock & Wilcox is also showing interest in the uranium-bismuth liquid fuel type with a graphite moderator.

Although the cost of uranium-generated power is now approaching conventional power generating costs, the last two or three mils will be the hardest to whittle down, according to Mr. Landis.

In a subsequent panel chairmanned by Vernon Pick, Dr. Arthur Griswold, assistant to the president, Detroit Edison Co., estimated that "it will be ten years or more before power from the atom becomes a reality." He said that the price of electricity will not be reduced materially unless developments not now known are devised as a "surprise element" in the picture. One of the difficulties facing commercial power companies is the fact that insurance companies will not issue policies to cover liabilities which might be incurred in the development of reactor projects. However he minimized the dangers in atomic pile operation by saying that there had been only one mishap in the extensive projects of the AEC and others now under way.

From a commercial standpoint, Dr. Griswold concluded that the breeder type "is the only one which offers full use of potential atomic fuels." He said his company will spend $3,815,000 on atomic power investigations this year. To give the audience some idea of the amount of uranium that would be required for atomic energy, Dr. Griswold said that about 200 tons of uranium would be required to start up a 100,000-kw reactor, and told the audience to "sharpen your pencils" and figure out how much uranium would be required if reactor construction were limited to the 2-million kw expansion in power plant capacity that goes on each year. The 200 tons of uranium is not used up, he explained, but it has to be there to make the reactor work.

Jack Knaebel, manager of Anaconda's New Mexico uranium project, showed a series of color slides tracing the development and present status of the mines, mills, and prospects involved in the project. Views of the Jackpile open pit convinced the audience that the orebody is one of the nation's most important.

Uranium geologists, reporting for the AEC, USGS, and private companies, seemed unusually willing to assert facts positively, and not hedge too cautiously with theories and probabilities. This is apparently due to the extensive geological research which has been going on, and is now bearing fruit. For instance, there was agreement among a number of speakers that the age of uranium present in Colorado Plateau deposits is late Cretaceous. At least two papers established the fact that uranium solutions which were associated with widespread volcanic action during the late Cretaceous had migrated and become fixed in carbonaceous strata such as lignite etc., and that studies of relative uranium content and trace elements have revealed the direction of movement of ore bearing solutions.

Palmer Keynotes Convention

At the opening session, Robert S. Palmer, executive vice-president of the Colorado Mining Association, stressed the problems facing the mining industry, which vary from the surplus of certain metals to the growing pains of the booming Colorado Plateau uranium industry. He promised no let-up in the battle to reach satisfactory solutions.

Armand G. Erpf, partner in Carl M. Loeb, Rhoades & Co., New York investment bankers, made a startling plea for cartelization of the mining industry. He said mining ventures are "still financed by the methods of the pushcart and the mountebank," leading to financial loss and discredit to the industry.

Erpf called for an attitude of "mature capitalism" that would use huge stockpiles and international production control agreements to stabilize metal markets. The industry must stop looking at stockpiling and at floor-price contracts with the govern-

MR. AND MRS. VERNON PICK catch the eye of convention visitors as they prepare to register for the CMA convention. Mr. Pick chairmanned a session on atomic power.

STUDYING A JAM-PACKED PROGRAM, F. E. Briber, of Stearns-Roger, and Max Bowen, CMA vice-chairman and general manager of the Golden Cycle mining operations.

PICKING OUT PROGRAM HIGH SPOTS, Frank Coolbaugh, vice president of Climax Molybdenum Co., Jim Thompson, of Humphreys Investment Co., and Clyde Johnson, Denver Equipment Co. and convention vice chairman.

ALL SET FOR A LIVELY SESSION. Miles Romney, manager Utah Mining Association; Silas Knowles, veteran mine operator and CMA member; and Otto Herres, president, Utah Mining Association and convention speaker.

ment as a form of socialism, he said.

In discussing how metal miners can meet tomorrow's technological demands, R. H. Ramsey and A. W. Knoerr, editors of *Engineering and Mining Journal,* New York, pointed out that metal miners face a squeeze between rising labor and supply costs and a comparatively fixed selling price for metals. Cost reduction is the only solution, other than artificial aids.

Large companies, they said, could afford the elaborate devices of automation, time studies, operations research, etc., but small operators have an inherent advantage in their freedom from the large overhead expenses borne by most operators. They outlined some of the ways by which small operators could cut costs, and Mr. Knoerr went on to mention several specific technological ideas or trends that could benefit miners, large or small.

Mr. Knoerr illustrated his talk with a 16-page "scrapbook of ideas," distributed among the audience beforehand, and to which he referred while speaking.

Eugene Hotchkiss, Vitro Corporation, in estimating the future of the uranium industry, pointed out the "obvious need for a large inventory of fuel for each reactor," but added that as recovery techniques improved, about 98% of the reactor's waste fuel might be reclaimed and re-used. He felt, however, that growing power needs would support a strong uranium mining industry, but called for vigorous activity by miners in promoting constructive use of atomic energy.

In discussing the outlook for the mineral industries for 1955, George Argall, editor of *Mining World,* pointed out the increasing application of the principles of human engineering and automation to mining, as in improved drill jumbos and loaders. He foresaw the greatest improvement in the near future in underground mining and in smelting.

In a zinc panel, Otto Herres, Combined Metals Reduction Co., blasted the Administration for not going along with the Tariff Commission's

BOB PALMER, EXECUTIVE VICE PRESIDENT OF CMA, welcomes two visitors, Edward D. Neuhoff and John V. Mueller of E. L. Cord Associates.

"HI MAC!" Bill Distler, of Climax Molybdenum Co., Herbert Fine, Bald Mountain Mining Co., and L. W. Ingles, of Colorado Fuel & Iron Co., greet Dan MacElhattan, of Mine Safety Appliances Co.

HARD-WORKING LADIES COMMITTEE, left to right, Mrs. O. W. Walvoord, Mrs. Clyde Johnson, and Mrs. W. T. Ahlborg, make Sour Belle Banquet reservations for Mrs. Florence Gunnell of Albuquerque, New Mexico, and Mrs. Vernon Pick, of Grand Junction, Colo., foreground.

bid for a higher tariff on lead and zinc. He agreed that stockpiling had helped the industry temporarily, but had failed to solve the real problem.

Richard A. Young, American Zinc, Lead & Smelting Co., said stockpiling "saved our necks." Although the export business is dead, he said, 1955 could be the biggest shipment year in zinc's history. He added, however, that strikes in the automobile industry this spring could ruin the outlook.

Ellis Lupton, Georgetown, Colo., spoke optimistically about the ability of small miners to survive in the future. He mentioned cooperative measures and installment buying of equipment as among aids to small mine operators.

Resolutions Adopted

Key points in the resolutions adopted by the convention were as follows:

1. Reasonable tariff protection should be imposed to give the domestic miner a price for his ore in keeping with present day costs.

2. Taxes must be reduced; depletion allowances extended to stockholders; exploration costs should be treated as mining expenses; tax exemptions should be granted new mines for three years; present limitation of depletion to one-half of net income is "absurd"—obviously the lower the net income—say 1 or 2%—the more the miner needs full depletion.

3. Severance taxes "should be buried in the graveyard of socialistic theories."

4. The Trade Agreement Act should be terminated.

5. Basic mining laws should not be changed, but the question of what constitutes a valid claim on irregular or bedded deposits should be clarified by amendment.

6. The Atomic Energy Commission's policy of stimulating production of uranium ore by private industry through sound pricing policy is commendable.

7. The mine access road program sponsored by the AEC and Government agencies is gratefully appreciated.

8. There can be no national stability until the Government returns to the gold standard with free convertibility.

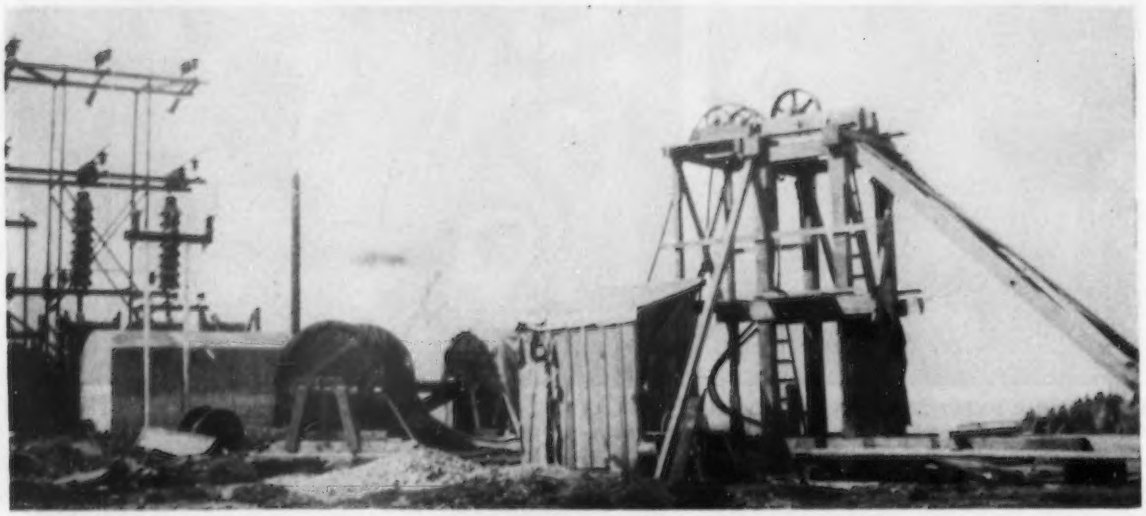
9. Restoration of silver coinage in the Asiatic countries now in the shadow of Communism will go far to stop the Communist threat.

10. Congress is urged to extend its present stockpile program until a sound metal mining program has been established to avert wholesale shutdowns of mines.

11. The International Monetary Pact, the Bretton Woods Agreement, and all other agreements prohibiting the unlimited coinage and free exchange and ownership of gold and silver coins and bullions in any part of the world should be abolished.

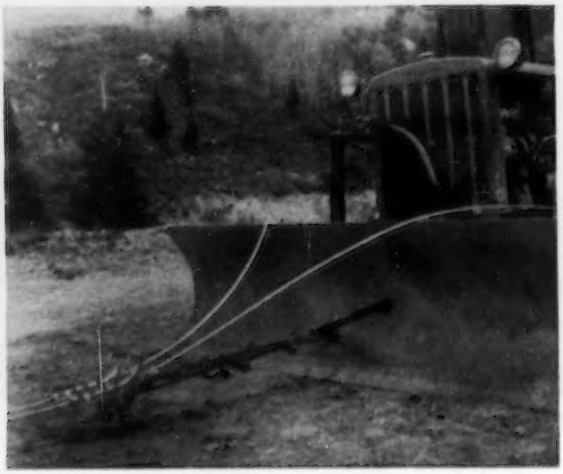
12. Import duties on lead and zinc under the Tariff Act of 1930 should be transferred to an ad valorem basis.

OPERATING IDEAS



TWIN POWER CABLES were lowered in a 6-in. borehole 50 ft from the mine substation and 44,000-v transformer banks.

Frank Stone, Bill O'Neill and Ted Smith of mine staff lower Syntron vibrator to locate bottom of bore hole.



Messenger wires used to lower cables are clamped to C-frame of Caterpillar tractor through hole in blade.

Lowering Heavy Cable in a 1500-Ft Borehole

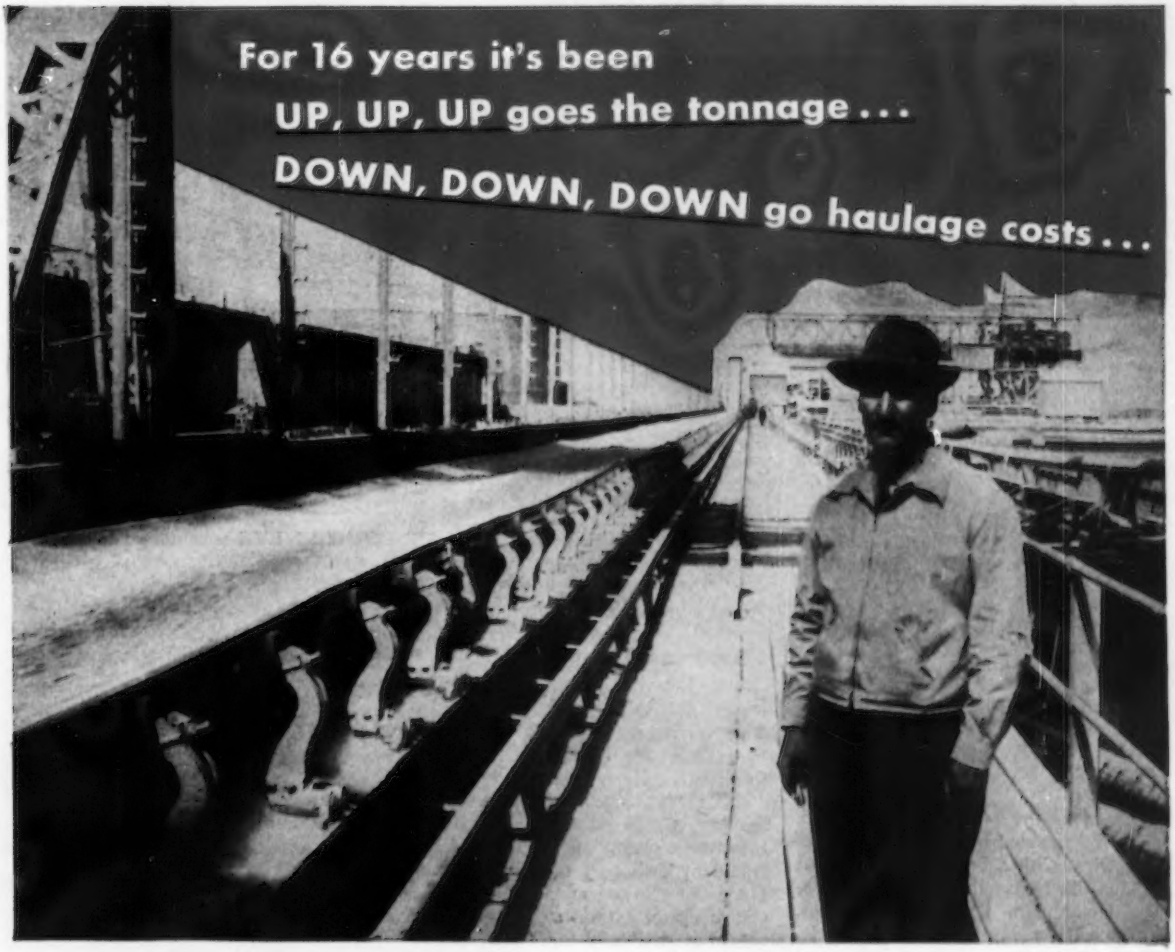
C. W. McCULLOUGH
Park City, Utah

THE JOB OF LOWERING heavy mine power cables in boreholes always requires careful planning and resourcefulness. The following article describes several unique techniques employed by the staff of United Park City Mines Co., at the old Ontario mine in the Park City, Utah, district. The replacement power cables were lowered to the 1500 (drain tunnel) level of this famous silver producer.

To provide a channel for the new cables, a borehole was drilled to a depth of 1300 ft and cased with 6-in. standard well pipe in 1952. Because of the shutdown of operations in June 1952, the cables were not lowered until this year. The old cable currently in use hangs in the No. 3 shaft, abandoned as an operating unit above the 1400 level in the early 1900s.

Owing to drilling difficulties, the borehole was bottomed at the 1300 level and plans were made to drive a connection from old workings above the 1400 level. Geophone soundings had been taken while the drill was still operating but a raise driven to the indicated point failed to intersect the borehole. With the drill rig no longer available to provide new soundings, a small electrical buzzer was lowered to the bottom of the hole. This could not be heard underground and a large Syntron vibrator was substituted. Cased in a steel waterproof cover, the vibrator was lowered with a hand reel using braided steel cable taped to two-conductor No. 18 electrical wire. This provided sufficient noise and vibration to enable the drillers to drive directly to the bottom of the boreholes. Below this connection, the cables follow old workings to the 1500 level.

Two lengths of neoprene-jacketed



35¢ per 1000 tons hauled—with this record-breaking "U. S." Belt

This belt was a record-breaker back in 1951. At that time it had completed conveying the amazing total of 100,000,000 tons of abrasive copper ore, and was in its twelfth year of service.

Installed in 1939, it has now been in continuous operation under rugged conditions for sixteen years. *Working 12 months a year, this belt continues to add to its record. Total tonnage to date: over 131,000,000 tons.*

Not only does this belt resist the extreme abrasive action of copper ore that would shorten the life of an ordinary belt—it is completely unhoused all year 'round and exposed to the direct rays of the sun—highly destructive to ordinary rubber.

Such success as this results from 3-way engineering teamwork; mine operators, designers of conveyor equipment, and United States Rubber Company belt engineers. This teamwork results in long, trouble-free service that has made "U. S." belts the most widely-used throughout the mining industry. You can obtain these quality belts and engineering service through any of the 27 "U. S." District Sales Offices.

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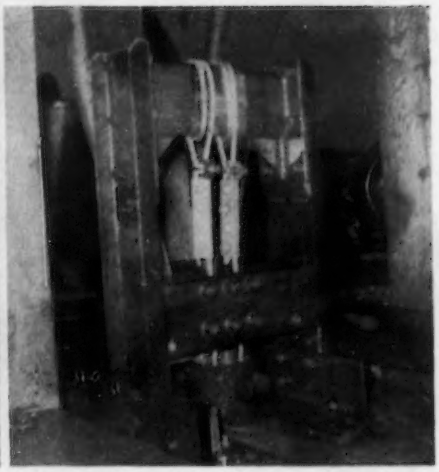
GENERAL ARRANGEMENT of cable reels, shaft head and tractor (shown at far right) which was used to lower the messenger cables.



MESSENGER WIRES are mounted on this permanent steel supporting frame above borehole.

cable were lowered, specifications as follows: length 1634 ft, diameter 2.27 in., weight per ft 4.55 lb. Three conductor, No. 4-0, stranded, 5000-v insulation, shielded and three No. 3 ground wires.

Messenger Wires Carry Cable

Carrying the cables were two ½-in. 7-strand, extra high strength messenger wires with a breaking strength of 29,000 lb. Heavy duty drop wire two-conductor, No. 18 telephone cables, unspliced, were attached to each cable. Each unit of cable, messenger and telephone wires was wrapped with 14 wraps of marlin, spaced 24 in. apart and coated with hot asphaltum compound.

The temporary wood headframe was constructed with a double platform which permitted workmen lowering the cable to apply wrapping and the coating of hot asphaltum compound.

Steel points were attached to the cable ends to facilitate free movement through the pipe column. Each cable, taped to its telephone wire, was lowered separately to the 200-ft mark, being played off the 84-in. reels by a truck winch line. At 200 ft, one cable was lowered 4 ft further before tying on the messenger wire to preclude stalling of the cables and no hang-ups resulted.

The messenger wires were then tied on, tapering the ends by cutting off two strands each at 6-in. intervals. These were taped onto the cables every 12 in. for 14-ft and four ¾-in. stainless steel clamps were added as a further safeguard against slippage. From this point standard marlin wrappings were used at 24-in. intervals and tarred with hot asphaltum compound. Steel clamps were added every 150 ft before tarring.

The two reels of messenger wire were located 550 ft from the headframe. With the weight of the 200 ft of cables in the hole sufficient to begin lowering, a D-7 Caterpillar tractor, 1935 model, was hitched onto the messenger wires at even tension through a clamp attached to the C-frame by drilling a hole through the blade. This arrangement permitted the Cat operator complete vision at all times, as well as a rapid lowering of the blade were additional braking power needed. However, this precaution proved unnecessary.

The headframe consisted of bolted 8x8 timbers 14 ft high with two decks for wrapping. The messenger wires rolled over a special double grooved 30-in. cast-steel sheave wheel running free on a 3 5/16-in. shaft. The cables were led over a double conical roller onto tandem 14-in. 2¼-in. grooved sheaves. Telephone cables were fed over small sheaves on opposite sides of the headframe.

Six-Man Crew Required

The crew consisted of six men: a Cat operator, two men for each deck and a utility-relief man. The cables were lowered 10 ft at a time, thus providing for five wrappings on each cable. The upper crew made three wraps, the lower crew two, but the latter did all the tarring. This arrangement kept the lower deck crew from being under hot drip had the upper crew done their own tarring.

Seven to twelve minutes were required to complete each ten ties and the tarring; nine minutes to apply the steel clamps every 150 ft. On an average the completed cables were lowered one foot per minute.

To hold the cables between shifts, temporary supporting clamps of 7-in. channel iron bolted back to back with 3½-in. center-grooved messenger grip plates welded in position, were used. These clamps had a gripping capacity of 3¾ tons and were seated upon the top of the borehole casing.

After the cables were lowered, these temporary clamps were bolted to the permanent supporting member. This consisted of two ⅜x6x6-in. angle iron base plates with 7-in. vertical channel irons 40 in. high. Two ⅜x5-in. steel bars spaced 1¾ in. apart connected the top of the vertical supports and 2-in. sections of extra strength pipe split lengthwise were welded to the top and bottom of the cross bars. Messenger wires were then wrapped twice around this hollow beam and clamped tightly with standard cable clamps.

The cable ends were drawn through 4-in. conduit buried in a trench 18 in. deep to the present sub-station and transformer banks 50 ft away.

Steel Hood Caps Hole

After the headframe was dismantled, the borehole and the supporting member were covered by a steel hood locked in place as a protection against tampering and foreign matter getting into the casing.

This method of lowering and supporting the cables was worked out by Frank Stone, mechanical superintendent, and the entire installation was made under his supervision.

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Sure we like big orders—and we handle them easily, every day, because our stocks are the world's largest, our cutting and handling facilities unsurpassed. But our business depends on small orders as well, and you'll find we never lose sight of this fact. Whether you want one bar or a thousand—one sheet or many tons, you'll get courteous service—quick delivery. Dependable, certified quality, too. Call us and see.

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MARKETS—Trends and Prices (Continued from page 69)

U.S. Mine Production of Lead

(Bureau of Mines)
In Tons

	1951	1952	1953	1954
States East of the Mississippi:				
Southern Illinois & Kentucky	2,629	2,777	1,849	786
Northern Illinois & Wisconsin	2,029	3,723	3,688	3,154
New York, Tennessee & Virginia	3,022	4,980	3,460	4,668
Totals	7,680	11,480	8,997	8,608
West Central States:				
Kansas	8,947	5,699	3,347	3,300
Missouri	123,702	123,955	125,895	123,040
Oklahoma	16,575	17,231	9,304	12,600
Totals	(a)149,253	146,889	138,546	138,940
Western States:				
Arizona	17,394	16,150	9,428	8,900
California	13,967	10,990	8,664	2,330
Colorado	30,336	30,000	21,754	17,700
Idaho	76,713	72,291	74,610	68,080
Montana	21,302	21,131	19,949	14,738
Nevada	7,148	6,850	4,371	3,440
New Mexico	5,846	6,880	2,943	870
Oregon	2	1	5	6
South Dakota	2	2	10	—
Utah	50,451	50,000	41,522	43,700
Washington	8,002	11,376	11,064	10,040
Totals	(b)231,206	225,727	194,320	169,804
Alaska (c)	21	1	9	—
Totals, United States	388,164	384,097	341,872	317,352

(a)Includes 33 tons Arkansas. (b)Includes 43 tons Texas. (c)Based on smelter receipts.

Zinc Stocks Reduced

Slab zinc stocks declined by 7,096 tons during January, due to continued large deliveries to the Government for its stockpile. Production increased again, the daily rate for the first month of the year being 2,778 tons, against 2,747 tons in December and an average of 2,379 tons a month for all of 1954, according to the American Zinc Institute.

A summary of the statistics for December and January, in tons, follows:

	(a) Dec. 1954	Jan. 1955
Stock at beginning	134,636	124,277
Production	85,164	86,106
Production, daily rate	2,747	2,778
Shipments:		
Domestic	74,900	70,863
Export-drawback	3,405	2,644
Government acc't.	17,218	19,695
Totals	95,523	93,202
Stock at end	124,277	117,181
Unfilled orders	45,862	57,421

(a) Revised figures.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments f.o.b. New York unless otherwise stated, tons of 2,000 lb. unless otherwise noted.

MISCELLANEOUS METALS

February 28, 1955

Aluminum ingot, 99 plus percent, lb.			23.2¢
Antimony, spot, lb., less than carload, in cases			31.97¢
In bulk, carload lots, f.o.b. Laredo			28.50¢
Bismuth, ton lots, lbs.			$2.25
Cadmium, commercial sticks, delivered, lb.			$1.70
Calcium, lb., ton lots, 98 percent, cast			$2.05
Chromium, 97 percent grade, lb., contract			$1.18
Cobalt, 9 to 99 percent, per lb.			$2.60
Germanium, lb.			$295.00
Indium, troy oz.			$2.25
Lithium, lb., 98 percent	$11.00	@	$14.00
Nickel, cathodes, lb., f.o.b. Port Colborne (a)			64½¢
Magnesium, 99.8 percent, carloads, lb., producer's plants, Freeport, Texas			27¢
Palladium, troy oz.	$17	@	$19
Platinum (wholesale lots) troy oz.	$76.00	@	$80.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$322	@	$324
Selenium, 99 plus percent, lb.	(b)$6.00	@	$7.25
Silicon, minimum 97 percent, carloads, lb.			18¢
Tellurium, lb.			$1.75
Thallium, 100 lb. or more, lb.			$12.50
Titanium, 99.3 plus, grade A, max. 3% iron, lb.			$4.50

(a)Includes U. S. duty. (b)Depending on quantity.

METALLIC ORES

Beryllium Ore, imported, 10% BeO, per short ton unit	$38.00	@	$40.00
Chrome Ore per long ton, f.o.b. cars Atl. ports, dry:			
44% Cr_2O_3 no ratio	$22.00	@	$23.00
48% Cr_2O_3 3 to 1 ratio	$43.00	@	$46.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:			
Old Range bessemer			$10.50
Mesabi bessemer			$10.25
Mesabi, non-bessemer			$10.10
Lead (Galena), 80 percent, Joplin, Mo., ton			$187.85
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties 84 @ 86¢ c.i.f. U. S. ports, duty extra. Long-term contract nominal at 82 @ 84¢ c.i.f. duty extra.			
Molybdenum Ore, 90%, per lb. of Mo f.o.b. mines			$1.05
Columbium-Tantalum, per lb., combined oxides			$3.40
Tungsten Ore, per unit of WO_3:			
Foreign 60 percent, c.i.f. U. S. ports, duty extra	$32.50	@	$33.50
Domestic, scheelite, 60 percent f.o.b. mill			$63.00
Vanadium Ore, per lb. of contained VO_3 f.o.b. mines			31¢
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton			$68.00

METALLIC COMPOUNDS

Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered			5¼¢
Cobalt Oxide, 72¼% to 73½%, ceramic grade, per lb.	$1.96	@	$1.97½
Copper Sulphate, 100 lb.			$11.25
Germanium Oxide, lb.			$142.00
Molybdic trioxide, technical, per lb. of Mo	$1.24	@	$1.25

ALLOYS

Ferrochrome 65 to 69 percent, per lb. of Cr. contained			24¾¢
Ferromanganese, 74–76%, net ton, seaboard			$190
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.49	@	$1.57
Ferrosilicon, 50 percent per lb. of contained Si			12¢
Ferrotungsten, 72 to 82 percent, lb. of W contained			$3.18
Ferrovanadium, per lb. of V delivered	$3.00	@	$3.25
Silicomanganese, Max. 1½ percent carbon, lb. per contracts			11.4¢
Spiegeleisen, per long ton, 19 @ 21% grade			$86.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton:			
Crude No. 1	$960	@	$1,500
Crude No. 2	$595	@	$900
Spinning fibers	$321	@	$514
Shingle fibers	$150	@	$200
Paper stock	$109	@	$137
Waste			$77
Shorts	$35	@	$70
Asbestos, f.o.b. Vancouver, B. C. (U. S. funds):			
Spinning fiber, 3-K			$460
Shingle fiber, 4-K			$185
Asbestos, Vermont, f.o.b. Hyde Park:			
Spinning fibers	$279.50	@	$302.00
Shingle stock	$135.00	@	$162.00
Paper stock	$81.50	@	$115.00
Waste, stucco or plaster			$71.40
Refuse or Shorts	$34.00	@	$63.00
Barytes f.o.b. cars:			
Georgia, crude, per ton			$15.00
Missouri, 94 percent $BaSO_4$, per short ton			$13.25
Bauxite, long ton, f.o.b. point of shipment:			
Domestic crude, 50 to 52 percent (not dried)	(a) $5.00	@	$5.50
Domestic, chemical, 53 to 58 percent	(a) $8.50	@	$9.05
Domestic, abrasive, 80 to 84 percent	(a) $18.00	@	$18.50
Feldspar, bulk ton:			
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50	@	$22.25
Glass feldspar, white, 20 mesh	$11.75	@	$12.50
Fluorspar, f.o.b. mines, bulk, 70% effective, ton	$28.00	@	$30.00
60% effective CaF_2	$26.00	@	$28.00
Acid 97% concentrate, bulk, ton			$47.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00	@	$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington.			$38.00
Mica—Domestic, f.o.b. mines. Punch 12 to 22¢ per lb. according to size and quality. Sheet clear, 1½ x 2 inch, 70¢ to 85¢; 2 x 2 inch, $1.10 to $160; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet, ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap $25 and up.			
Ocher, Georgia, ton, in sacks	$26.50	@	$30.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports			Not quoted
Sulphur, Texas, mines, long ton	$25.50	@	$27.50
Talc, f.o.b. works, ton			
New York, purified	$18.50	@	$20.00
Vermont, extra white			$13.50
Tripoli, Missouri, ton:			
40-mesh, cream colored			$30.00

(a) Normal. (b) Effective Oct. 1.

IRON AND STEEL

Pig Iron, gross ton, basic, Valley Furnaces			$56.00
Steel f.o.b. Pittsburgh, billets, net ton			$64.00
Structural shapes, Pa., Ala. etc., 100 lb.			$4.25

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In fact, the Process will granulate practically any soluble salt or mixture of salts so as to produce a uniform, free-flowing product.

There's a good chance that the Dorrco Granular Fertilizer Process will help increase your share of tomorrow's business. Dorr-Oliver operates a complete consulting engineering service backed by 35 years of experience in this field, and we will be glad to demonstrate the benefits of the Dorrco Granular Fertilizer Process in terms of your operation. Please address your inquiry to Dorr-Oliver Inc., Stamford, Conn.

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PERSONAL NEWS

ALVIN W. KNOERR

ROBERT H. RAMSEY

Alvin W. Knoerr (left) has been appointed editor of *Engineering & Mining Journal and E&MJ Metal & Mineral Markets* effective Feb. 15, succeeding **Robert H. Ramsey** (right) who has resigned to join the staff of the St. Joseph Lead Co., in New York.

A graduate of the Wisconsin Institute of Technology and the Missouri School of Mines and Metallurgy where he was awarded his B. S. in mining in 1938, and the professional degree of Mining Engineering in 1941, Mr. Knoerr joined the *E&MJ* staff in August 1944 and has subsequently served as associate editor and managing editor.

Mr. Ramsey, prior to joining McGraw-Hill in 1942 as assistant editor, was associated with Pato Consolidated Gold Dredging Ltd. in Colombia, as metallurgical engineer, and Pan American Engineering Co. in California. He has served as editor of *E&MJ* since 1952.

D. P. King has left Anaconda Mining Co. at Butte, to join the Atomic Energy Commission's Raw Materials Div., Denver Exploration Branch in Denver, Colo.

Virgil O. McCollum, with the company since 1932, has been named industrial relations director, United States Potash Co., succeeding **L. Hollister Jones,** retired.

George F. Weaton Jr. has been promoted from assistant mine superintendent, Leadwood division, to mine superintendent, Federal division, St. Joseph Lead Co.

The Institute of Metals, London, has announced the following awards: the Institute of Metals Medal for 1955 to **Dr. Colin J. Smithells,** director of research, the British Aluminium Co., Ltd.; the Rosenhain Medal for 1955 to **Dr. William Albert Baker,** research manager, the British Non-Ferrous Metals Research Assn.; and the W. H. A. Robertson Medal and Premium for 1954 to **Professor Hugh Ford** and **J. G. Wistreich.**

Charles R. Kuzell, general manager, has been named vice president in charge of Western operations, Phelps Dodge Corp., Douglas, Ariz. **Walter C. Lawson,** assistant since 1952, succeeds Mr. Kuzell as general manager.

M. L. Reyner, with the Atomic Energy Commission for 5 yr, has been named chief of the Phoenix sub-office.

Hugh Nichols has been named president of the newly-formed Arizona Uranium Ore Producers Assn. with headquarters at Globe. Other officers are **Thomas Oster,** vice president; **T. J. Long,** treasurer, and **Harold A. Beelar,** secretary.

Max J. Kennard has been named vice president in charge of operations for Combined Metals Reduction Co. and Pioche Manganese Co. Formerly general manager of Pioche Manganese and general superintendent and chief engineer for Combined Metals, he will be succeeded in his Pioche Manganese assignment by **James E. Orr,** former general superintendent.

James Boyd, manager of the exploration department since 1951, has been named vice president of exploration, Kennecott Copper Corp., succeeding **Anton Gray,** recently resigned due to ill health. Prior to joining Kennecott Copper, Mr. Boyd served as director of the U. S. Bureau of Mines for almost 5 yr.

Vincent G. Rumpf, mining engineer, has been advanced to recovery engineer, Compania Minera Choco Pacifico, Colombia, S. A.

Dr. G. M. Butler retired December 1954 from his position as dean emeritus of the college of engineering, University of Arizona, Tucson. A member of the university faculty for 39 yr, Dr. Butler served as dean of engineering until his retirement in 1951.

John S. Phillips took leave of absence from New Jersey Zinc Co. to do graduate work in geology and photogrammetry at Syracuse University.

Oliver Axelson has been transferred to the Albany Mine as mining captain, from Caspian, Mich., by Pickands, Mather & Co.

Arthur Horen has joined the Raw Materials Div. of United States Steel Corp. in Pittsburgh.

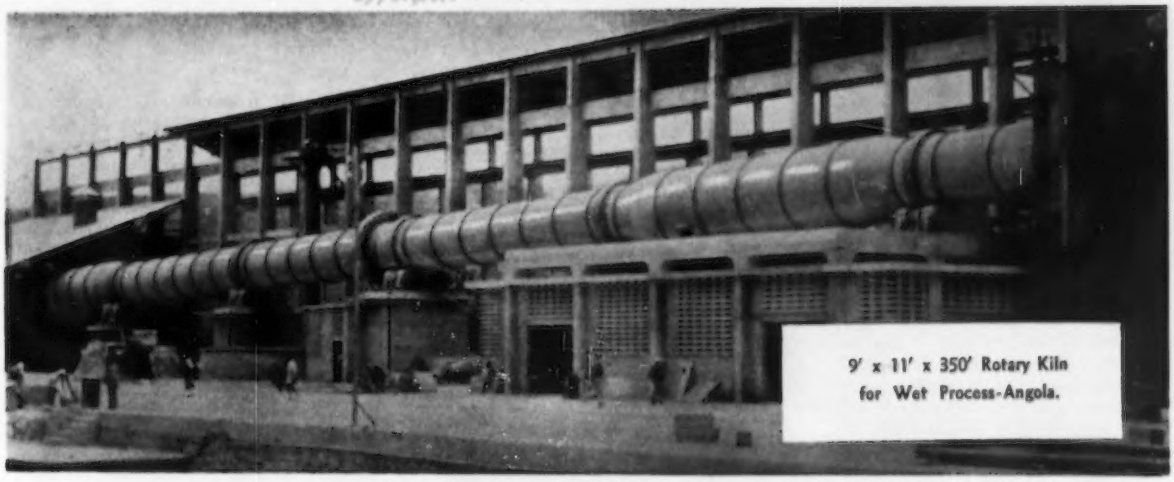
Frank M. Estes has left the U. S. on a professional trip to Colombia, S. A. He will be gone several months.

Winners of the AIME student prize-paper contest from Montana School of Mines are as follows: **Paul Allsman,** Knoxville, Tenn., on "New Techniques for Ore Search"; **James W. Allen,** with Miami Copper Co., Miami, Ariz., on "Geology of a Mineralized Breccia Pipe Near Basin, Montana" and **Rodney L. Helterline,** Butte, Mont., on "The Effect of Recovery on the Recrystallized Grain Size of High Purity Aluminum."

Dr. Lawrence R. Hafstad, recently retired director of the Atomic Energy Commission's Div. of Reactor Development, was granted the AEC Distinguished Service Award in recognition of exceptionally meritorious and effective performance of duty.

Pickands, Mather & Co. has made the following appointments: **M. L. Bradt** has been named general superintendent, Hibbing district, Mesabi iron range, succeeding **E. J. Fearing,** retired. **W. E. Seppanen** has been appointed superintendent, Menominee iron range operations, succeeding **H. J. Richards,** retired. **W. S. Home** succeeds **Lee McNulty,** retired, as chief clerk, Hibbing, Mesabi range office; **Matt Kayfes** succeeds **E. A. Munson,** retired, as chief clerk, Cuyuna iron range, and **A. W. Bullinski** replaces

FOR TOP PERFORMANCE..



9' x 11' x 350' Rotary Kiln for Wet Process-Angola.

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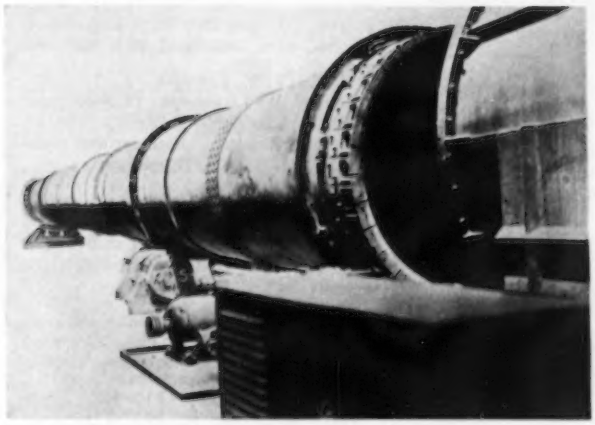

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George P. Lutjen has been named managing editor of *Engineering & Mining Journal*, succeeding A. W. Knoerr. Joining the staff of *E&MJ* in January 1949 as assistant editor, he was advanced to associate editor in July 1950. In June 1951 he left to join the staff of the assistant director, Div. of Raw Materials, U.S. Atomic Energy Commission, as mining engineer, returning to *E&MJ* as associate editor in March 1952.

B. D. Kennedy, retired, as chief clerk, Gogebic iron range. Retirement of the following also was announced by the company: **J. A. Doyle,** mechanical engineer; **Steve Fodor,** district mechanical engineer, Menominee iron range; and **J. C. Metcalf,** assistant general manager.

Masao Tanamachi, metallurgist, formerly with the M. A. Hanna Co., on the Mesabi iron range, is now with Minneapolis-Honeywell Co., Minneapolis.

Fred Stewart, general manager, Southwest Potash Corp., has been named a vice president, and will continue as general manager in charge of operations in New Mexico.

Everett Houghland, geologist, is president of the U.S. Tin Corp. Mill superintendent is **George Gardner,** formerly a metallurgist with tin interests in Bolivia. U.S. Tin operates the continent's only major tin mine, 90 mi north of Nome, Alaska.

C. Kremer Bain, consulting engineer, St. Joseph Lead Co., Bonne Terre, Mo., has retired from the company after 34 yr of service, to establish a private consulting practice in St. Louis, Mo., and to promote his shaft sinking methods and equipment.

Frank Thayer, general mill foreman of Kennecott Copper Corp., has been named to the post of assistant mill superintendent at the Chino concentrator. He succeeds **W. J. Ackert,** now with the Nevada mines division, McGill, Nev.

W. Church Holmes has resigned his position as metallurgist and mining engineer with Sunshine Mining Co., Kellogg, Idaho, to become general manager of the Mohawk mine and mill, near Silver Peak, Nev. Mohawk is a Bruhi property.

J. J. M. van Neer, Royal Netherlands Harbor Works quarry supervisor, is now on assignment at Mersin, Turkey.

Donald E. Myntti, mechanical engineer with Oliver Iron Mining, has been transferred from the eastern Mesabi operations to the Duluth general offices.

D. R. McDonell, Montreal Mining Co., retired Dec. 1, completing a service record of 47 years with the firm. He is succeeded by **Clifford Bertagnali.**

Nancy Parkes has been named copy editor of *Engineering & Mining Journal*, effective February 1. Joining the McGraw-Hill Publishing Co. in June 1952, she served as editorial secretary on *Coal Age*, another McGraw-Hill publication.

Thomas Richard, mining engineer for the Gogebic Range for Republic Steel, is now with Reserve Mining Co., Babbitt, Minn., on the Mesabi.

Oscar Franquist, Ironwood, Mich., master mechanic at the Penokee iron mine, Gogebic Range, was retired Nov. 1, 1954 after 46 years with Republic Steel.

Arthur Linz, vice president of Climax Molybdenum, has resigned to open his own offices as a technical consultant. He will make his headquarters in New York City.

John S. McNabb, Jr. has taken a post on the mining engineering staff of International Minerals and Chemical Co., Chicago. He was formerly mining engineer with the USBM at Butte, Mont.

Ingles M. Gray, mining engineer, is now in charge of the Grants, N. M., suboffice of the mining division of the AEC. He replaces **Edgar G. Butts,** who resigned to enter private industry.

C. M. Marquardt, formerly electronics engineer, Combined Metals Reduction Co., is now on a consulting basis with Combined Metals and with Pioche Manganese Co., and is developing the Industrial Physics & Electronics Co., Salt Lake City, Utah.

OBITUARIES

Walter M. Rothschild, 63, president of Associated Metals and Minerals Corp., New York City, died Jan. 22 following a heart attack. Mr. Rothschild held a law degree from Heidelberg and began his career with M. Lissauer & Cie., ore and metal traders of Cologne, Germany. He came to the U.S. in 1923 and was elected vice president of Associated Metals in 1928. In 1943, he became president.

Raymond P. Resse Jr., 58, assistant to the president, American Smelting & Refining Co., died Jan. 17. He joined the company in 1919 as a chemist, was named vice president in 1928, and assistant to the president in 1949.

F. Elmer Oswald, president, Pulva Corp., Perth Amboy, N. J., died Jan. 11. Well known in the process equipment industry, Mr. Oswald had been associated with sales and manufacture of pulzerizing equipment for 28 yr.

Luke Gilbert Bayley, 69, president, Spokane Molybdenum Mine, Inc., died recently in Spokane, Wash. Mr. Bayley began prospecting and developing mining properties shortly after World War I.

Harry W. Trump, 63, southwest district manager, Industrials Div., Timken Roller Bearing Co., died Dec. 25 in Dallas, Tex. He had been associated with the company since 1927.

Samuel W. Livingston, 72, vice president, Fred H. Lenway & Co., died Jan. 5 in San Francisco. Founder and president of Ore Metal & Engineering Corp., he joined Lenway in 1946.

Ernest Albert Stent, 94, California gold mine operator, died Dec. 23 in Belmont, Calif. He began his mining career before the turn of the century.

Ernest W. Davis, 64, director of engineering, Simplex Wire & Cable Co., died Jan. 11 following a heart attack. He joined Simplex in 1913.

Cleve A. Stover, 50, mining engineer in Mexico, died recently in Rolla, Mo., where he was taking graduate work at the Missouri School of Mines.

Carl M. Loeb, 79, former president, American Metal Co. and Climax Molybdenum Corp., died Jan. 3 in a New York hospital. Since 1931 he had been in the investment and brokerage business.

Henry Hardenbergh, 72, chairman, board of directors, New Jersey Zinc Co., New York, since 1951, died Feb. 9. Joining the company in 1905 as a chemist, he was elected president and director of the company in 1943.

Anaconda First to Roast Low Grade Sulfur Ore to produce SO_2 for Acid Manufacture

The world's first commercial installation for producing SO_2 gas from low grade sulfur ore, is now on stream at Anaconda Copper Company's plant at Weed Heights, Nevada.

The FluoSolids System that makes this possible includes four 18 ft. dia. Reactors plus other Dorr-Oliver and auxiliary equipment. SO_2 gas is sent to a 450 TPD contact acid plant which supplies all acid requirements for leaching 11,000 tons of copper ore per day.

Feed to the system is 650 to 750 tons per day and gas production 26,000 to 30,000 C.F.M. Gas strength averages 8 to 12% representing a sulfur recovery of 98%. Unusual? Yes, because this is the first time that low grade sulfur ore could be recovered as SO_2 . . . economically. Here's how the system works . . . ore averaging 28% total sulfur is crushed to 10 mesh and fed dry to the Reactors which operate in parallel. Once ignition temperature is reached no extraneous fuel is needed. Ore is simply fed in at the design rate, latent heat in the bed immediately brings it to ignition temperature, and the fluidizing air oxidizes the sulfur to SO_2. Shutting down is a matter of minutes. And because the fluid bed stores sufficient heat, roasting can be started again after as much as 72 hours without adding additional fuel.

If you would like more information of FluoSolids . . . the most significant advance in roasting technique in the last 30 years . . . write Dorr-Oliver Inc., Stamford, Conn., or *in Canada*, Dorr-Oliver Inc., 26 St. Clair Avenue, East, Toronto 5.

FluoSolids is a trademark of Dorr-Oliver Inc., Reg. U.S. Pat. Off.

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NOW 102 DRAWBAR HP!
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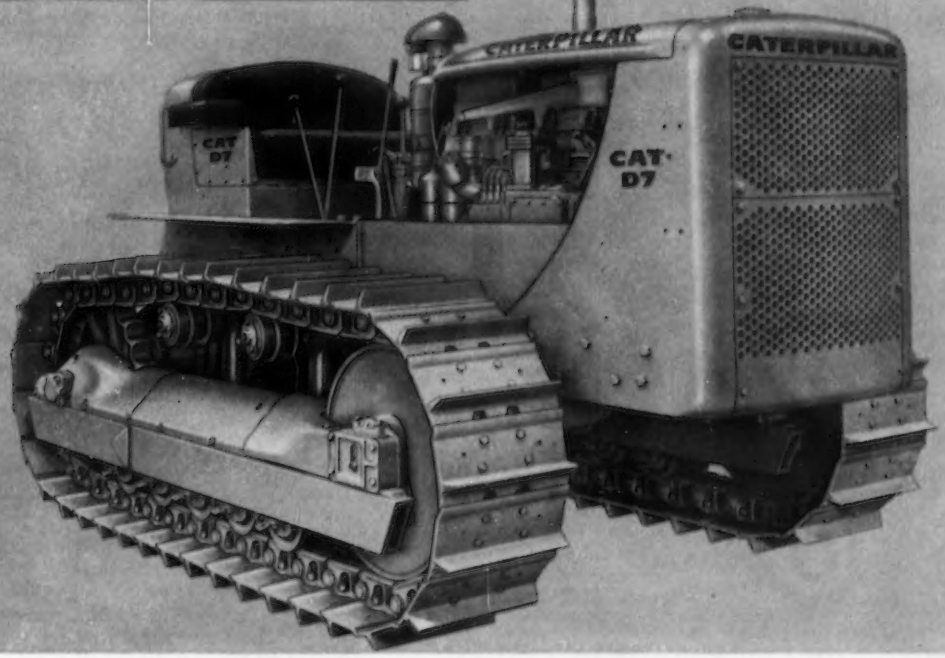

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DRAWBAR HP INCREASED to 102, engine HP to .28 (at 1200 r.p.m.).

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NEW STARTING ENGINE has more power for surer, faster starts in all weather, and simple single-lever control for easier operation.

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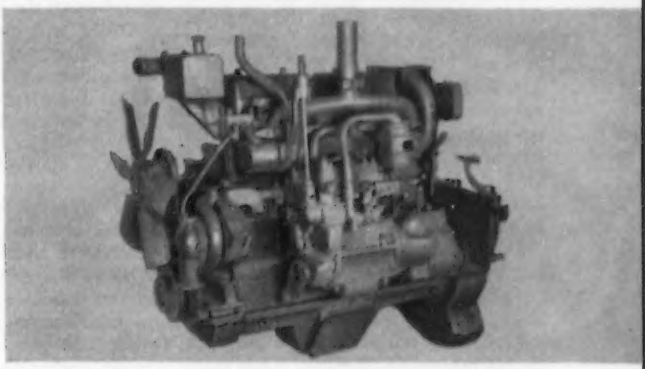

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WASHINGTON IMPACT

Morton A. Reichek, McGraw-Hill Washington News Bureau

DMEA Announces Fourth Quarter Progress: Johnson Backs 7-10-yr Advance U_3O_8 Market

ORE RESERVES INDICATED on 169 projects certified by the Defense Mineral Exploration Administration have an estimated net recoverable value of approximately $200,000,000, Secretary of the Interior Douglas McKay announced.

In releasing the Administration's report for the fourth quarter of 1954, Secretary McKay pointed out that the 115 applications for exploration assistance were the highest received in any quarter since the second quarter of 1953.

Applications were for projects located in 22 states and range from $2,448 for a mica project in North Carolina to $353,903 for a lead-zinc-copper project in Missouri. Total estimated cost of 110 of the projects was $5,777,619; five applications stated no amounts. Since the beginning of the program, 2,437 applications for exploration assistance have been received.

During the quarter 35 contracts were executed bringing the total of those executed to 704 for the program. Estimated cost of the work authorized in the 35 contracts was $1,649,311. The largest of the new contracts provided for a $1,058,370 lead-zinc-copper project in Idaho. This is the second largest contract ever executed by DMEA. The smallest contract executed in the quarter was for a $1,952 tungsten project in Utah.

DMEA field reports show that ore has been discovered on 250 projects, of which 169 have been certified. It is expected that certifications will be increased substantially after the work on the remaining 81 projects has been sufficiently advanced to permit an evaluation of ore showings.

During the quarter DMEA issued certifications of discovery or development on 16 projects, located in eight states and involving ten commodities. The first certification was issued for a project in Oregon. This certification covered a mercury project.

The 169 projects certified to date have an estimated cost of $7,628,638 with Government participation of $4,781,896. As of Dec. 31, 1954, only $3,590,962 in Government funds had been reported spent on the projects. Twenty of the projects are still in force and additional expenditures may be expected on them.

Of the 169 certified projects, 101 have paid royalties to the Government and of the 81 still uncertified but which have shown ore, 67 have made royalty payments. Seven of the certified projects have repaid the Government's contributions in full, one repayment in a lump sum of $83,493. Total royalty payments through December 1954 totalled $680,699, the net value of the ores on which these royalties were paid being approximately $13,613,980.

Office of Minerals Mobilization

Two basic sources of approval are upholding further action of the newly-formed Office of Minerals Mobilization, to be headed by Spencer Shannon. First is approval of the proposed budget of $300,000 for fiscal 1956, and second is security and Civil Service clearance for the 37 proposed members of the organization.

OMM will probably consider mercury, fluorspar, zinc and lead first, with others coming later. Reactivation of the Industry Advisory Committees may be anticipated.

Potassium

Potash producers complained to Assistant Secretary of Interior Orme Lewis over additional royalty required of them for mining in doubtful contiguous lands to their base holdings. In addition to the 5% royalty for production on base holdings, producers had to pay one dollar per acre or 15c per ton royalty additional for any production in the marginal areas. They felt this was out of line, since poorer deposits would not be mined if it costs more to work them.

Secretary Lewis promised prompt action on their complaint, holding the revised potassium regulations in suspension pending the decision. A decision may be reached by the end of February.

Producers were willing to go along with a one-shot bonus in place of competitive bidding on the contiguous lands. They feel that competitive bidding might bring trouble from "nuisance bids" of non-producers, hoping for windfall profits from possible ore discoveries, which they could resell to the producers.

Health Studies

United States Public Health Service is continuing with its study of the health of uranium miners in the Colorado Plateau, which began a couple of years ago. No indication has yet been found of health disorders caused by radioactivity.

The USPHS is now planning to study the mortality results for the last several years since its study began, to determine whether deaths of miners were out-of-line with the national average, and, if so, what the cause was.

Capitol Hill

Mining legislation in sub-committees on both sides of Congress has been moving very slowly so far. Still no staff director has been appointed on the House Mining Sub-Committee since Robert S. Butler was released. Some talk suggests the possible return of George Soule, who held the post during the 82nd Congress.

The Senate Mining Sub-Committee is planning an investigation of the Administration's stockpile program, but this will not materialize until April. In the meantime, the Malone report on South American resources will be completed. The proposed investigation of the stockpiling program will be slanted to determine the effectiveness of its long-range objectives. Manganese and mercury will be two of the most talked-about metals at that time.

Uranium

Dr. Jesse Johnson of the Atomic Energy Commission testified before the Joint Committee on Atomic Energy that he hopes the Government will maintain a 7-10 yr advance market for uranium miners and producers in order to justify the expenditures of private capital required for prospecting and exploration of the metal. In order to do this, he wants the Government to give miners and producers at least a five year notice before changing its requirements.

He told how the uranium mining industry had grown to more than 4,000 miners on 800 mines—mostly on the Colorado Plateau—contrasted

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to 50 miners in 15 mines back in 1948. Today American investment in foreign uranium mines is about $120- to $130-million in South Africa, and $45- to $50-million in Australia. He cited present uranium mining as in a boom status.

Although foreign uranium is being imported more and more into this country, domestic production is increasing even more rapidly. He said that domestic production alone could support the domestic consumption for the next 40 yr, if all continues at the same rate, but that he predicted present consumption might not be needed as rapidly in the future as a present. Johnson estimated a 600-ton minimum initial inventory to start atomic reactors in this country with a 50-ton replacement supply each year thereafter.

Metal Scrap

Representative Patterson (R-Conn.) has introduced a bill suspending all duties on metal scrap imported into the United States. The purpose is twofold—to aid hard-pressed American industry, and to decrease metal supplies going into the Soviet bloc. The bill has been referred to the House Ways and Means Committee, where it will probably remain for several weeks at the earliest before any action is taken on it.

Agriculture Barter

Agriculture Department is going ahead with its plan to establish its own stockpile of materials listed on ODM's supplemental stockpile list. Manganese, cobalt, antimony, chromite, lead, iodine, mercury, goose feathers, silk, and others would be warehoused from foreign barter of CCC foodstuffs.

Difference between this program—given the go-ahead on Feb. 8—and the barter program already in effect, is that the established program calls for foodstuffs to be bartered for materials contracted for by the ODM, which usually just pass through CCC's books. The new program, although looking to future sales to ODM, would be primarily aimed at disposing of perishable foods for less depreciable materials. Not only would materials be on CCC's books, but in CCC's warehouses as well.

Current CCC inventories run around $3.7-billion. To date, the new program has not negotiated a transaction. CCC is holding an additional $10-million in strategic materials for the stockpile, bartered under the older program, until ODM is able to buy the materials for which it contracted.

LABOR THIS MONTH

Alan E. Adams, McGraw-Hill Washington News Bureau

LABOR MERGER SHUNS LEFT-WING UNIONS: The new federation of AFL and CIO unions—to be completed this fall—will specifically exclude Communist-controlled unions. All other independent labor groups will be invited to join the Single Trade Union Center. But as long as such unions as Mine-Mill and Smelter Workers, the Electrical Workers (Ind.) and other CIO-expelled unions retain their suspect officials they won't be part of the merger movement.

REASONS FOR THE COLD SHOULDER TREATMENT: Both AFL president George Meany (who will head the single federation) and CIO chief Walter Reuther (to be a top lieutenant) are refusing all affiliation feelers from these left-wing unions. They bluntly warn that their strategy of seeking cover in the bona fide labor groups has failed.

THIS IS A TRIPLE BLOW TO MINE-MILL, WITH THESE RESULTS:

- MMSW officials hoped to escape the coming crack-down of the new Communist Control Act by seeking a place in the AFL-CIO group. This is because the law specifically states that any unions affiliated with the federations will be considered, on the face, not to be Communist-controlled, as a recognition of their anti-Communist stand. Without the shelter, Mine-Mill and others will soon face legal charges by the Justice Department designed to break-up the unions.
- The Red-dominated unions will be raided harder than ever by the new joint union. Both CIO and AFL have pledged separately to take over bargaining rights of Mine-Mill in non-ferrous mines; the CIO through its Steelworkers Union and the AFL via a special mine union department now being set up. When they're combined through merger, the attack will be even sharper.
- While refusing to deal with Communist labor leaders, the federations are wooing away locals from Red control. Meany and Reuther will accept any local affiliates who want to break away; so far the CIO has taken away 10,000 fur industry workers who voted to disaffiliate from the Fur and Leather Workers Union. More splits are to come.

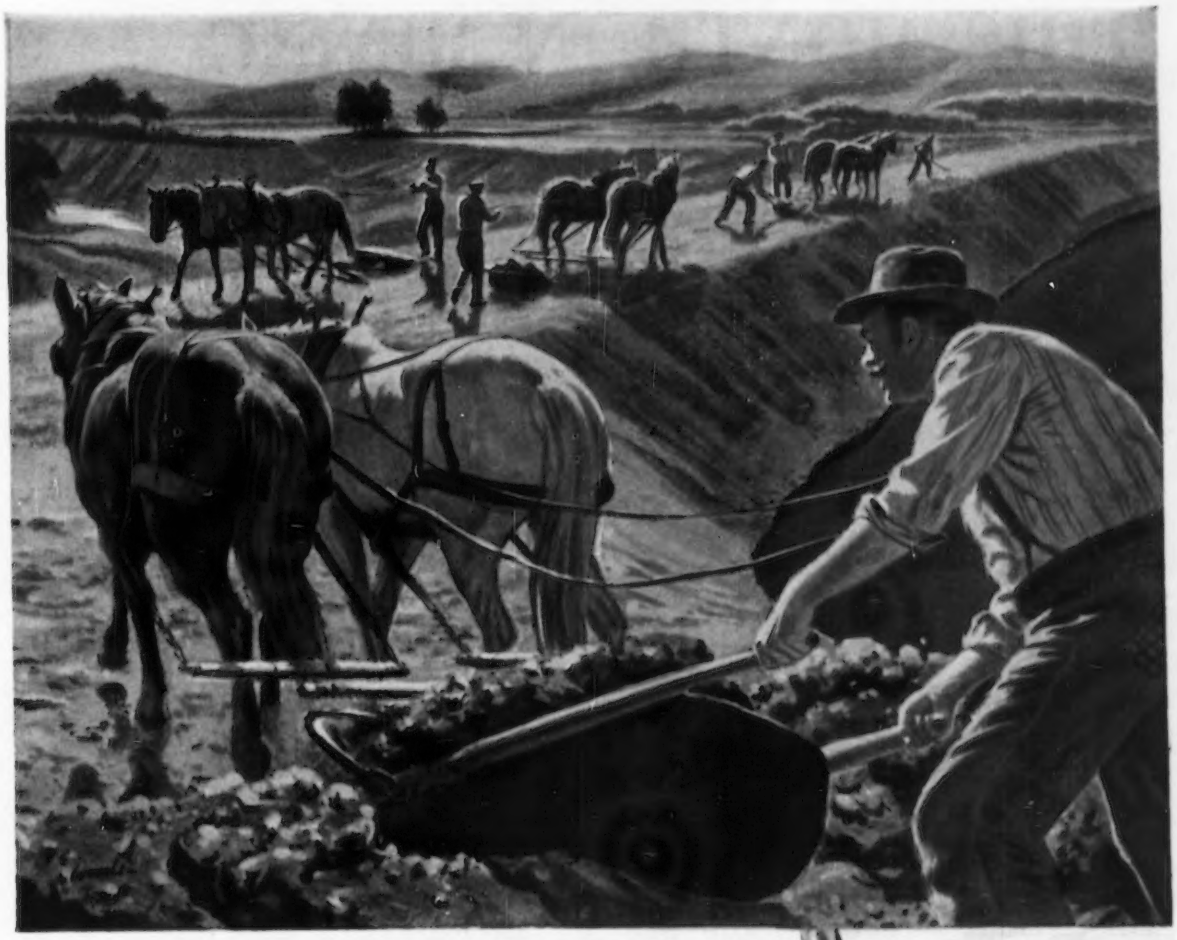
MINE-MILL FIGHTS INTERNAL DISSENTIONS: The troubles facing MMSW leaders aren't confined to the government and other unions. There's a move afoot at the all-important Mine-Mill local in Butte, Mont. to get rid of MMSW secretary-treasurer Maurice Travis—now under indictment on six counts of perjury in denying party membership.

The Butte local, largest and oldest U.S. Mine-Mill affiliate, voted 2-to-1 to force Travis' resignation. It's also reported that nearly half of the total 70,000 membership of the union favor his ouster. This is a direct blow at the leadership since Travis is considered the power behind the union's left-wing elements.

Mine-Mill leaders are still hoping to exploit "confessions" by former Red informer Harvey Matusow, who was a principal witness against Mine-Mill official Clinton Jencks at his trial on charges of party membership. Matusow says now he didn't tell the truth about Jencks—and Mine-Mill hopes to clear his name.

MINE UNION STALLS FEDERAL ACTION: One bright spot in a series of blows against Mine-Mill comes from the Federal courts. The union won a preliminary injunction against a National Labor Relations Board order barring it from using Government services—both in filing unfair labor practice charges against employers and appearing on NLRB representation ballots. This move could cripple Mine-Mill effectiveness against raids by rival unions—but the court agreed to hold up the order for review.

Another decision, by the U.S. Appeals Court, also went Mine-Mill's way. The court decided, in a case involving the Fur and Leather Workers Union, that rank-and-file knowledge of Communist associations on the part of their leaders is not grounds for withdrawing NLRB rights. This was the basis for the Board's ruling against Travis—that the membership knew he was a Communist when he filed his non-Red oath. But in view of this decision, it appears that the NLRB order won't stick.



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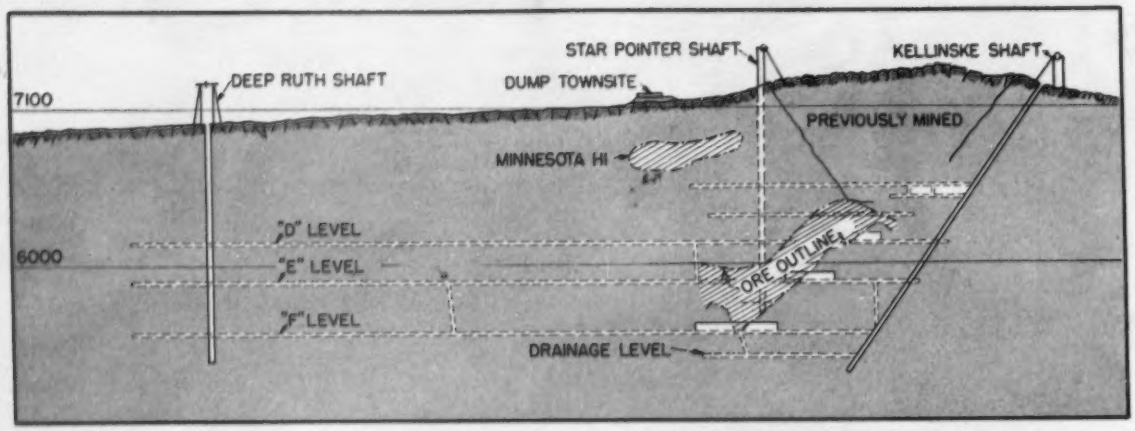
THIS MONTH IN MINING



NEW OREBODY, the "Minnesota Hi" is under old dump and townsite. Find was made by development shaft from Deep Ruth.

KCC Discovers Million-Ton Orebody at Deep Ruth

DISCOVERY OF A MILLION-TON orebody running 23.5 lb copper to the ton was made at the Deep Ruth underground block caving project of Kennecott Copper's Nevada Mines division.

J. C. Kinnear, Jr., division general manager, said the orebody, known as the Minnesota Hi, was uncovered in progress of development at the $21-million project, which was started in 1951.

Until the Minnesota Hi has been exploited, Kennecott will defer the mining of 20-million tons of low grade copper in the Deep Ruth. Also deferred will be scheduled development work on the Deep Ruth, principally because the Minnesota Hi lies within the zone of planned caving operations.

The old Star Pointer shaft will be reconditioned and pressed into service for mining the new orebody.

Deep Ruth shaft is now below 1360 ft, 546 ft below the "D", or first planned production level. Kinnear said the Kellinske shaft has reached nearly 1350 ft and is projected 2400 ft on a 55 deg slope. Main drift from the Kellinske is now 3700 ft long—within 700 ft of completion.

Ore from the Deep Ruth will be hoisted at a rate of 30 mph through the Deep Ruth Shaft. The Kellinske will be used to bring in materials, ventilation.

During sinking of the Kellinske, large bodies of water were encountered. Kennecott engineers estimate they have pumped at least 5,750 gal of water per day. When pumping failed to control fluid levels, fissure areas were cemented off. Still another, but smaller body of water was encountered recently and is being pumped at a rate of 4300 gpm.

Original discovery of the Deep Ruth was made in 1937. Churn drilling and a prospect shaft confirmed outlines of the deposit, which runs 17 lb copper to the ton.

L. F. Pett, general manager, Utah Copper, said production of mill copper would be increased by 3.5-million lb to 46-million lb monthly at Kennecott's western mining division.

Increase was accomplished by adding another shovel crew at the Bingham pit, hiking ore from 83,000 to plus 90,000 tpd.

Only last December, Utah Copper hiked production of all copper at its Utah properties by nearly 5-million when it went on a 7-day work week.

Mr. Kinnear announced commencement of a 7-day work week at the Nevada Mines division White Pine properties which will add output of 1,025,000 lb at the McGill reduction plant. Consolidated Coppermines Co. production, which is processed by Kennecott Copper, will also increase, and is included in the overall 1,025,000-lb addition.

Plateau Activity Hits New Expansion Peaks

THE CROWDED WASTELAND of the Colorado Plateau has seen uranium activity more than double in the past two years. Figures which show the scope of the boom are contained in the booklet, "Mesa Miracle," now in its fourth printing by U.S. Vanadium Co., a division of Union Carbide and Carbon Corp.

Expenditures in the 180,000 sq mi area have skyrocketed from $30-million two years ago to $100-million per year in 1954. Personnel has more than doubled: 1500 trained geologists and mining engineers in exploration work against 200 in 1952; 1,000 Government people against 500 in 1952; 1,000 drillers against 250; 2,000 mill personnel against 1,000; 3,000 miners against 1,000.

USV last year employed as many as seven different contract drilling firms. Total drilling expenditures by private industry in the Four Corners topped $5-million and total feet drilled rose from 2-million to 3½-million per year. The 1952 figure of 200 operating mines has been tripled.

Ore truck operation has increased from 100 to 200; supply trucks from 50 to 75; 9 mills process the ore. Even on the most desolate roads in the busy mesa country, several trucks may pass one another in less than five minutes' time.

Typical in the rapid growth is the activity of USV in the town of Uravan, Colo. In 1952, it had 800 inhabitants; today about 1500, nearly 1,000 of them employees of the company. Thirty new 3-bedroom houses have been built by USV. The company also aided in additions to the school, (pop. 260) and pays a major share of operating expenses.

Sherritt Gordon Ships First Nickel to GSA

INTERNATIONAL NICKEL CO. shipped 450,000 lb of refined nickel to the General Services Administration in late January. Shipment is the first of a minimum of 4.5-million called for in the contract completed last fall between the company and the U.S. Government.

Contract called for refining of certain nickel concentrates produced by Sherritt Gordon Mines Ltd. to be delivered before August 1955. As a result of improvements to its procedure for treating this concentrate, Ralph D. Parker, general manager of Canadian operations, said, Inco will be able to increase deliveries materially beyond the contract minimum.

AS & R Begins Examination of Anomalies On Property of New Utah State Prison

AMERICAN SMELTING & REFINING CO. has concluded negotiations with the Utah State Board of Corrections to explore three copper anomalies on the site of the state's brand new prison.

Interest in the area 18 mi south of Salt Lake City was spurred last year when a USGS aerial magnetometer survey showed three separate highs, indicating an intrusive sub-surface condition. All three anomalies are on the 1,097 acres controlled by the state.

AS&R is sinking three preliminary drill holes on the property. A lease was filed with the state shortly after the discovery which gave them prior negotiation rights.

Company officials point out that there is no indication that the intrusive upthrust outlined by USGS fliers contains any ore. But geologists note that the area is about half way between Park City district and the big open pit at Bingham. "It's on the axis," says one.

One problem to be considered is the fact that the prison ground is located below the Jordan Narrows, which separates the big Utah Lake, a fresh water body, from Great Salt Lake. It is believed that a lot more water travels through those narrows underground than is indicated by the small, meandering Jordan River, which connects the lakes.

Basis for the Board-AS&R talks was: 1) that AS&R will do nothing to impair operations at the prison or on nearby U.S. Highway 91 while drilling; 2) in event ore is discovered in commercial quantities, AS&R will pay state royalties on a sliding scale basis. Payments on ore running as low as $1.50 per ton would be 1% of net smelter returns or 3% of mill returns, whichever is greater. At top of the scale ore valued at over $50 would pay 25% of net smelter or net mill returns.

Mining Calendar

Ninth Western Metal Congress & Exposition, March 28-April 1. Los Angeles, Calif.

Canadian Institute of Mining and Metallurgy, Annual Meeting, April 19-21, Royal York Hotel, Toronto, Ont.

American Zinc Institute, 37th Annual Meeting, April 28-29, Drake Hotel, Chicago, Ill.

Colorado School of Mines Engineers' Day, April 15-16. Golden, Colo.

New Mexico Geological Society, Ninth Annual Meeting, May 13-15. Gallup, N. M. Field trip through Gallup-Grants Uranium District.

17th National First Aid and Mine Rescue Contest, October 1955, Knoxville, Tenn.

GSA Announces Level of Strategic Stockpiles

QUANTITIES OF STRATEGIC MINERALS, bought through Dec. 31, 1954, under the Government's programs to stimulate production and search for domestic tungsten, manganese, chrome, mica, beryl, asbestos and columbium-tantalum were announced recently by Edmund F. .Mansure, head of the General Services Administration. The programs are separate from the exploration projects of the Defense Minerals Exploration Administration, Department of the Interior.

TUNGSTEN—Purchase of 3-million short ton units (20 lb each) of contained tungsten trioxide has been authorized under the program first announced in May 1951. Delivered to date: 1,460,051 short ton units.

MANGANESE ORE—Quantities authorized are: 6-million long ton units (22.4 lb each) of contained manganese for Butte and Philipsburg, Mont.; 6-million long ton units for Deming, N.M.; 6-million long ton units for Wenden, Ariz.; and 19-million long ton units for carload lots at any rail point in the country. Delivered to date: Butte and Philipsburg, 1,418,058 units; Deming 2-213,221 units; Wenden, 5,820,541 units; carload program, 2,275,617 units.

CHROME ORE—Purchase of 200,000 long tons of ores and concentrates at Grants Pass, Ore. Delivered to date 77,-399 long tons.

MICA—Program was published March 15, 1952. Purchase of 25,000 short tons of hand-cobbed mica or the equivalent has been authorized. (For purposes of the program, 90 lb of block or film mica are considered as the equivalent of 1 ton of hand-cobbed mica.) Delivered to date: 4,816 tons of all types at all depots. Depots at Spruce Pine, N.C.; Custer, S.D.; and Franklin, N.H.

BERYL—Authorized purchases from domestic sources 1,500 short tons. Delivered to date: 557 tons.

ASBESTOS — Crysotile asbestos in three grades, Crude 1, 2 and 3; accepted at Globe, Ariz. Purchase of 1,500 short tons of No. 1 and/or No. 2 has been authorized. Crude No. 3, which is accepted on a tie-in basis with the other two grades, is not figured into the quantity authorized. Delivered to date: Crude 1 and 2, 717 short tons; No. 3, 333 tons.

COLUMBIUM-TANTALUM — Purchase of 15-million pounds of combined columbium-tantalum pentoxide (foreign and domestic) authorized. Delivered to date 7,354,279 pounds. Columbium in lots of 2,000 pounds or more and tantalum in lots of 1,000 pounds or more are purchased from both domestic and foreign sources through four agents—Fansteel Metallurgical Corp., North Chicago, Ill.; Wah Chang Corp., New York, N.Y.; Kennametal, Inc., Latrobe, Pa.; and Emergency Procurement Service, GSA, Washington, D.C.

Cerro de Pasco Loan

CERRO DE PASCO CORP. has arranged an $8-million five-year loan with the Bank of Manhattan Co., Bankers Trust Co., National City Bank, and J. P. Morgan & Co., Robert P. Koenig, president, announced. The loan will be used for financing its share in the recently-organized Southern Peru Copper Corp. Other participants in the project are American Smelting and Refining Co., Newmont Mining, and Phelps Dodge.

Montana Mining Assn. Spurs State Expansion

ELEVENTH BIENNIAL CONVENTION of the Mining Association of Montana, held in Helena Jan. 26, was noted by attending members and guests as one of the most successful and enthusiastic in the history of the organization.

Officers for 1955-56 were elected by a unanimous vote. They include: Fred E. Burnet, operating superintendent, Montana Phosphate Products Co., president; Charles S. Burriss, plant manager of Ideal Cement Co., first vice president; John Bley, manager, American Chrome Co., second vice president; Ted E. Collins, head of Collins Land Co. and retiring president, member at large, executive committee. Carl J. Trauerman, mining enginer, was reelected secretary-treasurer and also honored by a resolution which cited his "untiring efforts on behalf of mining in Montana," and extending the influence of the organization "to all mining states and Canada."

Burnet

Other resolutions unanimously adopted advocated:

1. Revival of small mine operation in Montana; offering standard prospecting permits at low cost and providing prior right to apply for and receive a long-term mining lease on areas where discoveries are made.

2. Increased research appropriations for the Montana Bureau of Mines and Geology. Cited in particular was the need for immediate study of the state's ground water resources.

3. Printing and distribution of complete topographic mapping of the state. At the present time, only 14% has been "adequately mapped" by the topographic division, USGS.

4. Increased financial aid to the Montana School of Mines, particularly to keep pace with new fields of mine and mill technology. "We regard such appropriations, not as an expense, but as an investment."

Members of the nominating committee were: Joseph T. Roy, manager, East Helena plant, AS&R; Dean A. E. Adami, Montana School of Mines; Robert Olund, manager, Butte office, Ingersoll-Rand Co.

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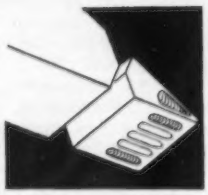
Extend repointer or dipper tooth life on your dippers with Amsco "Wear-Sharp" repointers. When you fill their end grooves with Amsco hardfacing rod, you protect the tooth at the 6 points of maximum wear. This prevents corner blunting and equalizes wear along the entire cutting edge so that the tooth *stays sharp.*

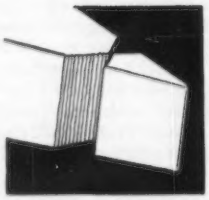
Order Amsco repointers from your Amsco distributor. He carries a complete line of Amsco manganese steel dipper teeth, shapes and hardfacing materials.

Besides manganese steel, Amsco makes other alloy steels with high resistance to impact and abrasion.

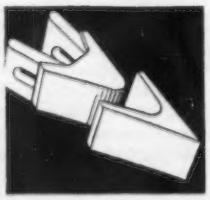
FACTS ABOUT 3 TYPES OF AMSCO REPOINTERS



"Wear-Sharp" Repointer (patented)—To equalize wear and maintain a sharp cutting edge, grooves on each end and on corner faces can be filled with a tough hardfacing deposit. It prevents the tooth from rounding or blunting. Teeth stay sharp, helping to maintain digging speed and to conserve power. Available straight (shown) or with crescent-shaped backs.



Repointer Bars—Excellent for rebuilding teeth used in heavy digging, these repointers are made of tough, wear-resistant manganese steel. They are delivered in bars of 3-foot length and cut to the width of the tooth on the job. They are also being used for rebuilding lips on dippers, clamshell buckets, ore loaders and dragline buckets.



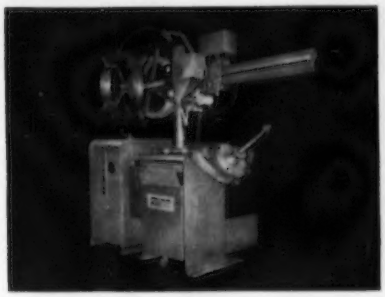
Cast-to-Shape Repointers—Ideal for less severe digging, these manganese steel repointers are easy to weld on. An average-size tooth can be completely rebuilt in about 15 minutes, using only two electrodes. Cast with "ears" that protect the flat sides of the tooth, these repointers add strength and service life to the entire tooth.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

THE AMSCO® HARDFACING LINE IS COMPLETE . . .

Hardfacing Rods and Electrodes . . . A complete line of manual and automatic build-up and hardfacing materials. One for every repair job. Amsco rods and electrodes contain alloys of the toughest, hardest metals known including manganese steel.



Automatic Welders . . . The Amsco-Leader line of welders permits fully automatic build-up and hardfacing, especially in fields using heavy-duty equipment. Welding positioners and power unit included in package.

Amsco Repointers . . . Add the long wearing quality of manganese steel to digging equipment. All you do is weld them on. Available also are rounds, squares, flats, plate, grouser bars, electrodes—all made of manganese steel.

Free Booklets . . . Make it easy to select the proper Amsco hardfacing rods—or manganese steel shapes. Ask your distributor or write for these detailed booklets. Request No. 953 (hardfacing) and No. WA-77 (repointers, grouser bars, filler bars, plate).

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AMERICAN MANGANESE STEEL DIVISION

AMERICAN Brake Shoe COMPANY

Chicago Hts., Illinois

USBM, Census Cooperation

U.S. BUREAU OF MINES is cooperating with the Bureau of the Census in the gathering of information for the first census of the mineral industries to be taken since 1939. Main purpose of the cooperation is to apply special knowledge of USBM personnel to the collection, summarization and publication of the great mass of data being compiled.

Where practical, the Bureau of Mines has suspended its regular statistical program and used information gathered in the census for its own records. Purpose is to minimize the reporting burden on industry.

IN THE U.S.

ALASKA

U. S. Smelting, Refining and Mining Co. is moving its No. 5 dredge from Eldorado Creek to Dome Creek, in the Fairbanks district. The dredge, fourth to be moved in recent years, is cut into four sections and carried on specially-designed bobsleds. Gas heaters warm the sled runners for easier starting.

Brewis Red Lake Mines, Ltd., of Toronto officially announced their acquiring of the DeCoursey Mountain Mining Co.'s mercury holdings on the Kuskokwim River in late January. Company name is now DeCoursey-Brewis Minerals, Ltd. New equipment is being moved toward the properties, and key men will soon be at hand for exploration work which will include sinking a shaft. Production is planned for as early in the season as possible.

Glenn Franklin and Charles Herbert, placer miners of long standing in Alaska, will be mining this summer on Livengood Creek, scene of the Livengood Placers and Callahan Zinc-Lead dredging operation. They will mine by open cut with a dragline, rather than dredging.

CALIFORNIA

California division of mines has reported to Governor Goodwin J. Knight that there are now close to 100 authenticated uranium localities in the state, a number of which show promise of commercial importance.

The division said favorable for prospecting for uranium are the Mojave Desert region; San Bernardino Mountains and the eastern parts of Riverside and Imperial Counties.

New Idria Mining & Chemical Co. has purchased Strawberry Tungsten Mines and will operate as a division of New Idria.

In the $1,075,000 transaction New Idria acquires an operating mine about 75 mi northeast of Fresno, together with a 125-ton mill on the property. It also takes over the assets and liabilities of Strawberry Tungsten. Last year the company grossed $1-million and netted $383,000 after taxes.

C. Hyde Lewis, New Idria vice president, said New Idria will retain the Strawberry management. The mine can be worked only 6-7 months of the year due to heavy snows, he added. This year operations will start May 1 and continue through November, with 70 men employed.

Lewis said recovery has been running better than 1%.

Highly radioactive material has been found in an old gold mine shaft in Tuolumne County near Columbia by J. Bartell Kress of Columbia and Dr. Ben Boice of Sonora.

According to Stephen Bruff, geologist who inspected Radium No. 1, it contains a primary ore which has not been identified. "It seems to be the result of replacement of carbonaceous material, and a 5 lb sample studied by the AEC assayed at almost 4%," he said.

He said the ore has been found in very small quantity, extensive faults making it difficult to locate. Boice and Kress are now deepening the shaft of the old gold mine, which was in the Kress family, he said.

COLORADO

More uranium now is being mined in the Rocky Mountain region than is being imported from Africa and Canada, says Robert S. Palmer of Denver, executive secretary of the Colorado State Metal Mining Fund.

Statistics on domestic uranium production and on imports are kept secret for security reasons, Palmer emphasized. But, he continued, "it is generally understood that up until quite recently, about 80% of all the uranium needed to supply U. S. requirements came from abroad. The chief source was high-grade stuff from the Belgian Congo.

"Canada was second, and our domestic mines ran a poor third, at the outset. Some time ago, Colorado Plateau sources moved into second place. And now, to the best of my belief, the Colorado Plateau and the Great Basin area of Wyoming, Montana and the Dakotas recently have pushed into first place. Not because imports are any less, but because home production is so much greater.

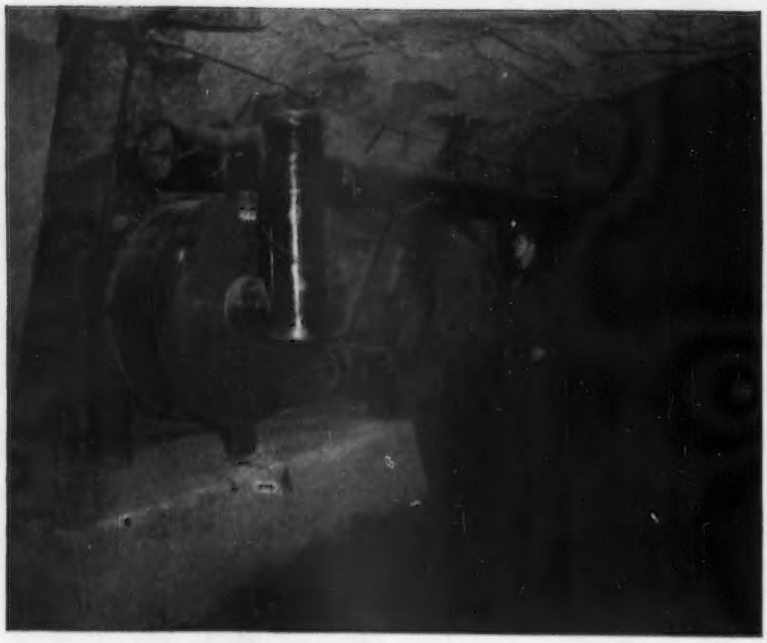
"Our uranium production has amazed the experts. It is climbing ahead of mill capacity. Raw uranium in the form of ore—some of it of sufficiently high grade to compare favorably with that from the Belgian Congo is being stockpiled at the mills.

"It is vital . . . that domestic uranium production should continue, with all possible encouragement."

Sweeping revision of Colorado mining laws to help uranium prospectors is being considered by the state legislature.

Rep. John Vanderhoof of Glenwood Springs and Rep. Frank Hays of Denver,

MAN-MADE WEATHER UNDERGROUND



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Colorado *(Continued)*

urging revision, declared present laws are "antiquated," and Sen. Sam T. Taylor said "90% of the uranium claims staked in this state probably are invalid." D. Lew Williams of Norwood, uranium millionaire and former state senator, agreed.

Chief hitch in present laws is the requirement for a 10-foot-deep "discovery cut" on each claim.

Three Durango men disclosed discovery of what appears to be a primary pitchblende deposit in La Plata canyon, once a famed gold mining district, and said surface ore has tested 1% uranium.

Kenneth Owens, Arthur Puffer and J. C. Morris said they found uranium ore in the area a year ago, but kept the strike secret until exploration work could be undertaken. Control of the property has been sold to a group of Denver men. Core drilling and further work in the old Tomahawk gold mine tunnels will be started as soon as the snow clears.

Contracts for 42,000 ft of core drilling in the Bull Canon area of Montrose and San Miguel Counties were let by the AEC in February. Grand Junction operations office said the drilling would "test the local validity of several guides to ore in the Salt Wash and examine the lithology of the Chinle formation for criteria of favorability."

Contract of the Walker-Lybarger Construction Co. with the AEC for construction and maintenance services under the Grand Junction operations office is to be extended until Jan. 1, 1957. The Walker-Lybarger Co. now has about 400 employees working under the contract.

Quenton L. Brewer has resigned as deputy director of the exploration division of the AEC at Grand Junction to become general superintendent of operations for Walker-Lybarger. He had been with the AEC since 1953.

Vanadium Corporation of America announced in January a 5c an hour wage increase for employees at the Naturita mill and for men in company-owned mines in the area. The boost brings the basic pay rate for laborers to $1.63 per hr.

Jim Provo, 42, quit his job as custodian in Denver schools and disclosed he and his brother-in-law, H. W. Christ of Palisade, had been offered $1-million flat for 130 uranium claims staked last fall between Gunnison and Saguache. Temporarily, Provo said, the claims are tied up in a lease.

Employees of the U. S. Vanadium Co.'s plant at Rifle have chalked up a record of two years without a lost-time accident. A. L. Schaefer is safety engineer at the plant.

James P. Blackledge, head of the metallurgical division of the Denver Research Institute of the University of Denver, reports the institute is developing methods of making metallurgical analyses within minutes.

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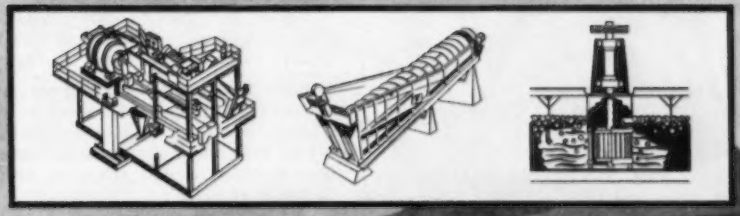

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Sizes and Types: WEMCO Thickeners are job-tailored to specific applications and are available in sizes up to 400′ diameter. Job requirements determine use of Beam (up to 45′), Lo-Truss (32′ to 60′), Hi-Truss (60′ to 100′), Center Pier (75′ to 175′) or Traction (125′ to 400′) type of construction.

Features: Depending on application, WEMCO Thickeners offer a wide choice of construction and mechanical features. These include: heavy duty worm or spur gear mechanisms and bearings; large feed wells; strong cast spiders; overload alarms; manual or motorized screw lifting devices on small sizes; vertical hydraulic lift on Center Pier type; chain and sprocket gear-motor drive on small sizes; dual fluid drive on Center Pier and Traction types; large diameter discharge cones; wood or steel tanks.

WEMCO HYDROSEPARATORS:

Sizes and Types: WEMCO Hydroseparators are available in sizes up to 100′ diameter. Duty requirements determine use of Beam (up to 40′), Lo-Truss (35′ to 55′), or Hi-Truss (55′ to 100′) type of construction.

Features: Depending on job requirements, WEMCO Hydroseparators offer a wide range of construction and mechanical features, including: heavy duty worm gear mechanisms and bearings, large diameter cold rolled steel shafts, large feed wells and discharge cones, strong cast spiders, manual or motorized lifting devices and efficient drive arrangements.

WEMCO DIAPHRAGM PUMPS:

Sizes and Types: WEMCO Diaphragm Pumps are available in 2″, 3″ and 4″ sizes. Each size can be obtained in either simplex, duplex or triplex arrangements.

Features: WEMCO Diaphragm Pumps are designed and built for efficient, trouble-free operation. Features include: Rugged welded steel frame, uniformly weighted rubber ball valves, rubber valve seats, long wearing rubber diaphragm, adjustable stroke and indicator, handwheel-operated variable speed drive for speed adjustment while pump is in operation.

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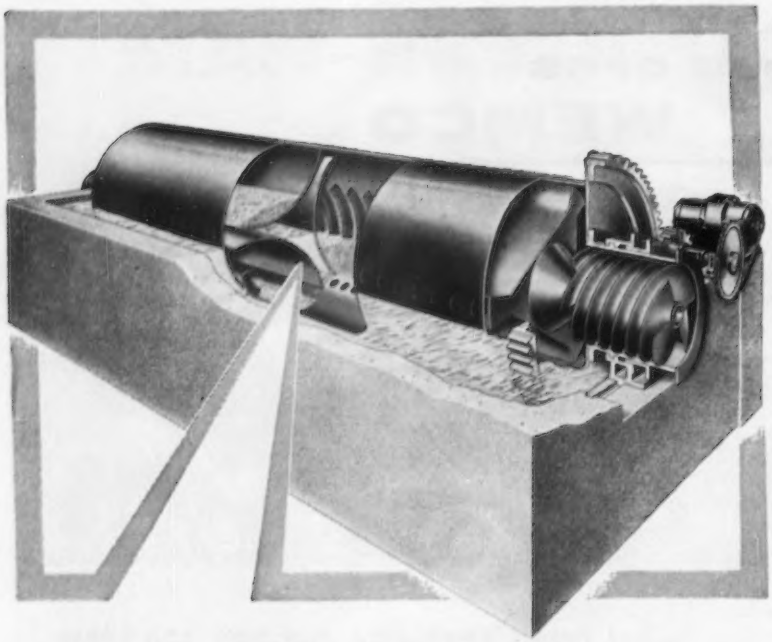

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WRITE FOR BULLETIN

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

Colorado *(Continued)*

Blackledge said analysis of an uranium ore sample can be made in five minutes by fluorescence X-ray spectography. Standard wet chemical methods may require as much as three days.

The method can be used on liquid, solid or gaseous substances, Blackledge said. Its value is not confined to uranium.

William J. Carey, independent oil operator of Dallas, Texas, announced he and Climax Uranium Co. have entered into a joint exploration and development contract involving Climax properties on the Colorado Plateau.

Carey will spend between $125,000 and $150,000 on a core drilling program. Climax will manage production from orebodies he discovers.

Climax early in February also announced Western-Knapp Engineering Co. of San Francisco has been awarded a contract for installation of leaching and filtration equipment in connection with expansion of the Climax processing mill at Grand Junction.

Frank Coolbaugh, president of Climax Uranium Co. and vice president of Climax Molybdenum Co., believes mining once again may take over the No. 1 spot in Colorado industry, now occupied by agriculture.

Coolbaugh

Coolbaugh told a Denver Chamber of Commerce luncheon that research will find new fields of usefulness for many metals now little known or used, just as molybdenum was 35 years ago.

Formal recognition that uranium mining in the West has developed into a permanent industry came from four Government agencies, Colorado Highway Engineer Mark Watrous disclosed recently, when they agreed to put development of access roads on a permanent rather than an emergency basis.

Surveys have been completed and active work is scheduled to commence soon on a 23-claim uranium lease that has been obtained by the Globe Hill Uranium Co. of Colorado Springs in the Slick Rock district, 17 mi east of Dove Creek, on the Colorado Plateau. A tunnel will be started on a 3-ft ore showing and a series of diamond drill holes will be sunk from 50 to 250 ft in depth to explore the area further.

Receipts of silver at the Denver U. S. mint in 1954 topped 1953 intake by more than 40%, mint officials report. The large increase in silver was attributed to increased receipts from Kennecott Copper Corp. operations in Utah.

Quarter million dollar consideration was involved in the sale of part of the Grizzly Gulch holdings and the Commonwealth mine and mill by John and Ellis Lupton to the Greater Minerals Corp. of Chicago.

Turbo-Topics

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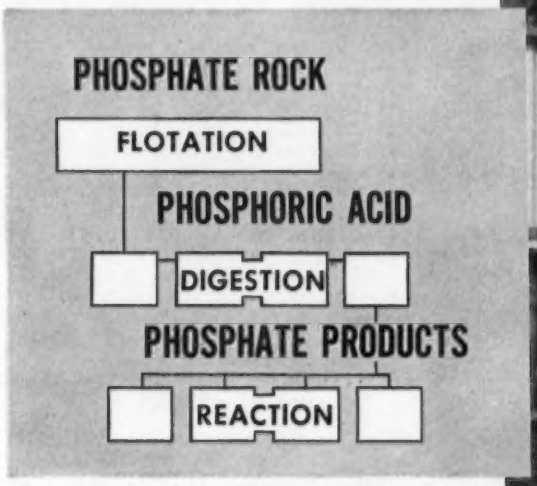

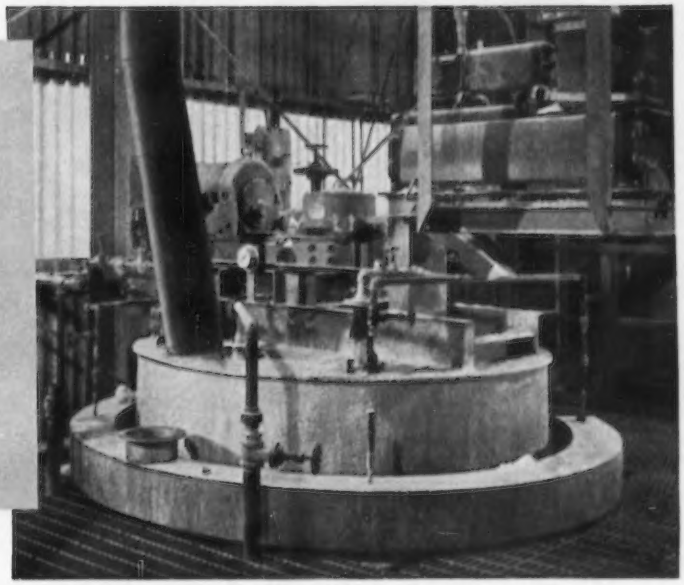

Acid Neutralizer At Phosphate Products Plant of Virginia-Carolina Chemical Corporation, Fernald, Ohio. Phosphoric acid is neutralized in the pictured Turbo-Mixer at the Fernald plant. It provides suspension and distribution of solids for uniform reaction on a Continuous-Flow basis and promotes removal of evolved gases.

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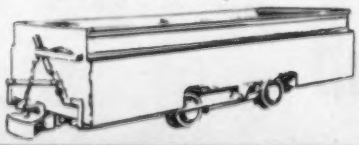

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Colorado *(Continued)*

Directors of Greater Minerals Corp., and their consulting engineer, Sewell Thomas of Denver, are planning to increase the capacity of the Commonwealth mill to 100 tpd, about double its former capacity and to revamp the mill for installation of a cone crusher.

Colorado mineral production reached an all-time high in 1954, with a total dollar value of $241,800,000, according to a year-end preliminary report prepared by A. J. Martin of the U.S. Bureau of Mines staff in Denver.

The total included petroleum production, estimated at $120-million, but excluded uranium and vanadium. Uranium and vanadium production figures were withheld by the Atomic Energy Commission, but competent observers have estimated uranium production alone at $100-million for the year.

Value of mineral production in the State has increased each year for eight straight years. Figures in the Bureau of Mines report included:

Molybdenum production in 1954, 43-million lb, all from the Climax Molybdenum Co. property in Lake County. (1953 total was 33,740,000 lb.)

Silver production, 3.4-million troy oz in 1954, against 2.2-milion in 1953. Value was calculated at $3,077,000 for 1954, against $1,991,398 in 1953.

Copper values, $2,613,600 for 1954 against $1,688,134 in 1953.

Tungsten, $3,067,200 in 1954 against $2,883,338 for 1953.

Lead values dropped 19% from 1953, for a total of $4,814,400. Zinc slipped 8%, from $8,696,070 to $7,714,500. Gold went down 20%, from 119,218 troy oz in 1953 to 95,000. The decrease in value was from $4,172,630 to $3,325,000.

Biggest single producer of gold in the state was Golden Cycle Corp.'s Ajax Mine in the Cripple Creek District of Teller County.

ARIZONA

Underground operations at the Kennecott Copper Co. Ray division shut down Jan. 28 after 43 years of working.

For several years the copper mine has been in the process of converting to open pit operation. Salvage crews will prepare the underground workings for conversion to open pit.

During its lifetime, the underground section produced more than 64,300,000 tons of copper ore.

Utah Construction Co., Comstock Oil & Uranium Co. and Santa Cruz Uranium Co. announced completion of a $500,000 joint venture deal for mining of uranium ore in the Tyndall district, midway between Nogales and Tucson, Ariz.

Utah will put up $250,000, while Comstock and Santa Cruz will ante $125,000 each. It is first uranium venture for Utah Construction, world-wide mining and contracting firm founded at Ogden, Utah.

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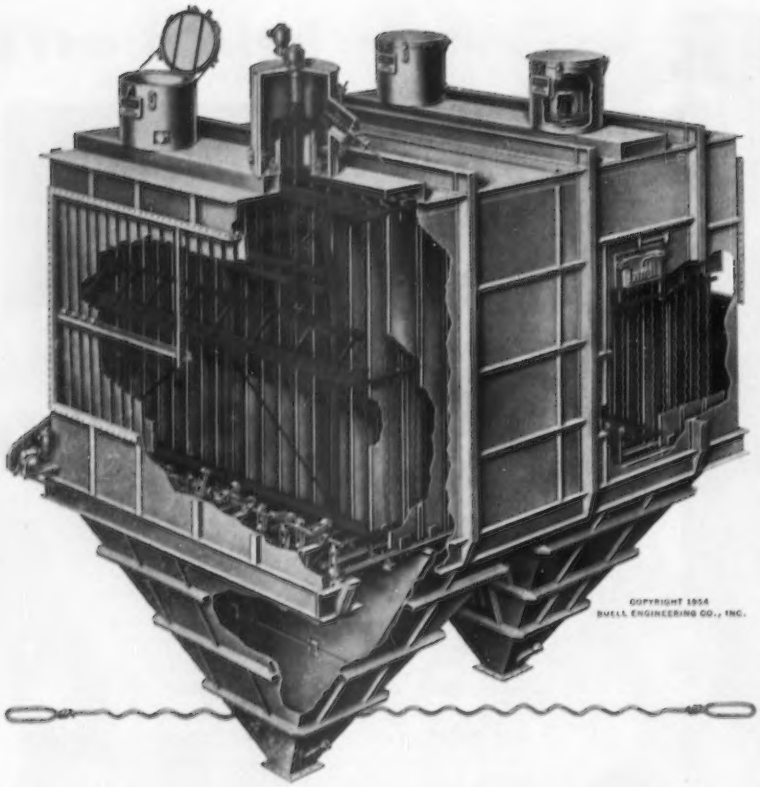

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Arizona *(Continued)*

McFarland and Hullinger, Utah mine contractors, report Cerro de Pasco Corp. is negotiating to purchase the Old Dick mine near Prescott, Ariz.

The Utahans sold the properties to Dr. Edwin L. Larson, Phoenix, Ariz., who acted on behalf of the Manhattan Consolidated Mining Co., of Tonopah, Nev., they said.

However, the purchasers have yet to pay in full for the properties. The negotiations to date have been between Dr. Larson and Cerro de Pasco representatives.

IDAHO

Sunshine Mining Co.'s 1954 production totaled 260,647 tons of ore, an increase of 4½% over 1953 and the highest since 1941. The total includes output from adjoining properties which Sunshine operates under profit-sharing agreements. Company officials attributed the increase to an improved labor supply situation.

Idaho's mine production of gold, silver, copper, lead and zinc declined about 4% in 1954 to $49,522,402, the lowest level since 1946, according to preliminary totals compiled by the U. S. Bureau of Mines. Sharp decreases in lead, zinc and gold output more than offset substantial gains in the production of silver and copper.

Coeur d'Alene District in Shoshone County accounted for 95% of the state's zinc production, 94% of the silver and 93% of the lead.

The state retained its position as the nation's leading producer of silver.

Whitedelf Mining & Development Co. has installed additional pumping facilities at its mine near Clark Fork to handle a heavy flow of water encountered in the new south exploration crosscut on the 800 level. The water course was hit about 700 ft south of the shaft station, about 50 ft short of the estimated position of the Thornton ore shoot.

Hecla Mining Co. has concluded an operating agreement with U. & I. Uranium Inc. of Kellogg for exploration and development of the latter's Radon and Hot Rock properties in the Big Indian District of San Juan County, Utah, on a profit-sharing basis.

Drilling exploration is continuing and extensions of the ore zone are reported. Initial coring proved an orebody 2400 ft long, an average of 6 ft thick, and ranging from 100 to 400 ft wide, containing a "probable" 200,000 tons of good grade ore.

Under the agreement Hecla also will explore the 35-claim Hot Rock group which adjoins Radon on the west.

Agreement provides that Hecla reimburse U. & I. for its exploration costs on both groups, $97,883 in the case of the Radon and $82,620 on the Hot Rock. Hecla will get 100% of the profits on the Radon group, after payment of a 15% royalty on net smelter returns to

Why brute loads don't "bust" this screen

● Here's a screen built to take abuse . . . a screen specifically designed to handle large quantities of *big, heavy* rock and ore.

The main frame of this powerful PIONEER Mesabi Vibrating Screen is built from 18" car channel or I-beams and reinforced with 8" wide flange cross beams. Screen frames are constructed from extra-heavy channels, pipe, angles, and bars. Pan side thicknesses range from ⅜" to ½", depending on size of screen. Angle bracing at critical points adds further strength and rigidity. Beefed-up shafts are built to take it.

EFFICIENCY. PIONEER Mesabi screens are not only rugged, but you just can't beat them for fast, accurate separation.

That's because PIONEER's full circle, forward throw agitation produces an identical, positive motion from one end of the pan to the other. Every inch of this screen works for you.

Near-perfect balance is maintained by placing the shaft at the pan's exact gravitational center and counterbalancing the flywheels to offset the throw of the pan. This gives precise end-for-end, top-for-bottom balance at all times. Since vibration is confined to the pan and not transmitted to the frame, less power is needed and equipment lasts longer.

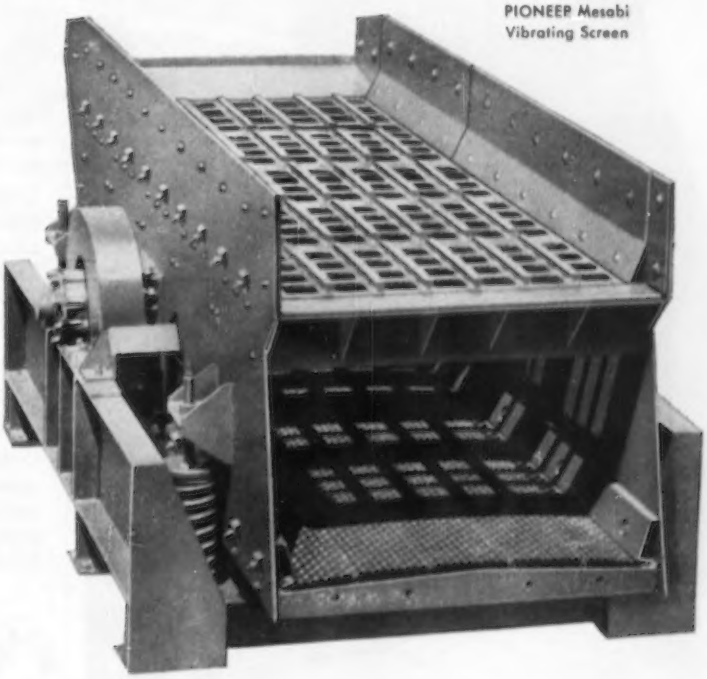
OUTPUT. PIONEER screens are known for their extra capacity. Positive throw, down-hill agitation, and use of the entire screen surface, combine to deliver maximum tonnage.

SPECIFICATIONS

Size	Horse-power	Approximate weight in pounds		
		1 Deck Scalping	2 Deck Scalping	2-Deck Gradation
4'x10'	15	8,900	8,800	8,000
4'x12'	15	10,000	10,000	9,100
5'x10'	20	11,800	11,800	11,000
5'x12'	20	12,800	12,700	12,000
5'x14'	25	13,700	13,600	13,000
6'x12'	30	14,550	14,200	13,800
6'x14'	30	15,800	15,300	14,900

Ask your screen salesman these questions

1. Will frame resist sagging and twisting under heavy loads?
2. Is vibration effectively confined to pan?
3. Do both ends of screen vibrate equally with the middle?
4. How efficient, percentagewise, is separation?



PIONEER Mesabi Vibrating Screen

For detailed features, specifications, and performance data, write Pioneer Engineering Works, Inc., Minneapolis 13, Minnesota, or see your nearest PIONEER Distributor.

BUY BOTH! HIGHER OUTPUT LOWER UPKEEP

Pioneer *Continuflo* EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.
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Please send information on equipment checked.

- ☐ GRAVEL PLANTS
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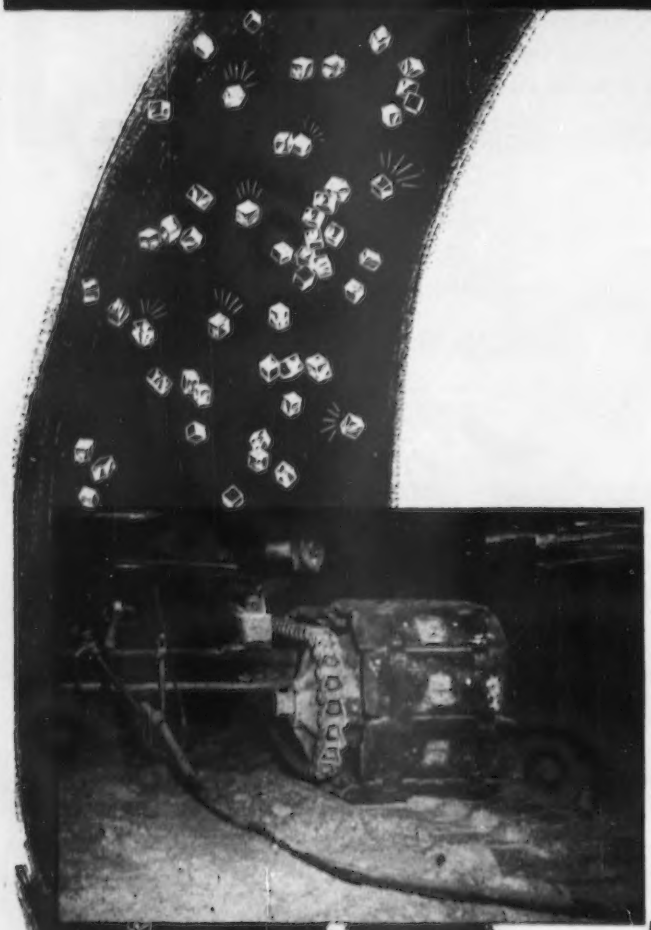
- ☐ MECHANICAL FEEDERS
- ☐ ROCK PLANTS
- ☐ BITUMINOUS PLANTS
- ☐ VIBRATING SCREENS
- ☐ JAW CRUSHERS
- ☐ APRON FEEDERS
- ☐ BUZZER SCREENS (LIGHT DUTY)
- ☐ ROLL CRUSHERS
- ☐ ORO FEEDERS
- ☐ CONTINUFLO CONVEYORS

Name_____
Company_____
Address_____
City_____ Zone____ State_____

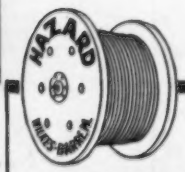
Jefferson Island salt mine standardizes on HAZACORD . . . and saves



Jefferson Island Salt Mine—where salt analyzes better than 99% pure NaCl—is located 1,000 feet below sea level at Jefferson Island, Louisiana. Operating conditions in the salt beds are so difficult that ordinary cables were chewed up by the abrasive action of the salt. Before standardizing on Hazacord Portable Cables, 25 to 40 man hours per week were spent on repairs to the portable cables used on undercutters, jumbo drills and electric shovels. Now—with Hazacord—this costly repair work is eliminated.

Toughness to resist abrasion, twisting and flexing, such as in this installation, is built into every Hazacord by vulcanizing the Hazaprene ZBF sheath in a continuous metal mold. The Hazaprene sheath resists such destructive agents as acids, alkalies, moisture, and most oils and greases. Hazard heat-resisting insulation assures long electrical life because of its high safety factor under all operating conditions.

Consult your Hazard representative for recommendations on the Hazard cable applicable to your operating conditions or write Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.



HAZACORD

Mold-Cured

portable cables

2133

Idaho *(Continued)*

the owners, until its costs have been recovered. After that Hecla's share is 21.25% (or 25% of 85%) of the net smelter returns. U. & I. gets a similar share. The owners of the claims get the 15% royalty, plus 50% of the remaining smelter returns. U. & I., it is understood, holds a portion of the royalty rights.

On the Hot Rock group, Hecla gets all its expenditures out of first profits, if any, and subsequent profits are divided equally between the two companies, after payment of a 10% royalty.

The agreement also provides that any and all additional deposits in and adjoining the Radon and Hot Rock groups, or within the immediate area, acquired by either Hecla or U. & I. will be operated by Hecla, with profits shared equally.

Two shipments of silver ore from the old Weber mine in the Lakeview District of Bonner County have netted New Rainbow Mining Co. $1,416. The ore was taken from a raise started last fall on the east ore shoot above the No. 4 main adit level.

One 53½-ton carload assaying 22.54 oz silver and 0.05 oz gold brought $697, and a 60-ton carload running 20.90 oz silver and 0.06 oz gold brought $719.

Officials said the ore pinched down about 65 ft above the level but at 95 ft was beginning to come in again. A drift at the 100-ft point to delineate the ore zone is planned.

Preliminary drilling exploration has been started by Sidney Mining Co. and Mascot Mines Inc. on their joint uranium venture on the Colorado Plateau, with Mascot as the operating company. First test holes on the 36-claim Sand Flat group in Grand County, Utah, have disclosed a favorable sandstone horizon with unusual radioactivity just a few feet below the surface.

The Alto group on Beaver Mesa in Mesa County, Colo., purchased by Mascot last summer, is also included in the joint venture. Drilling of this property will be undertaken at a later date.

Exploratory crosscutting on the new 750-ft level at the Vindicator Silver-Lead Corp. property has encountered a fissure vein in the big Vindicator shear zone about 210 ft north of the shaft, along with several stringers containing lead-silver mineralization.

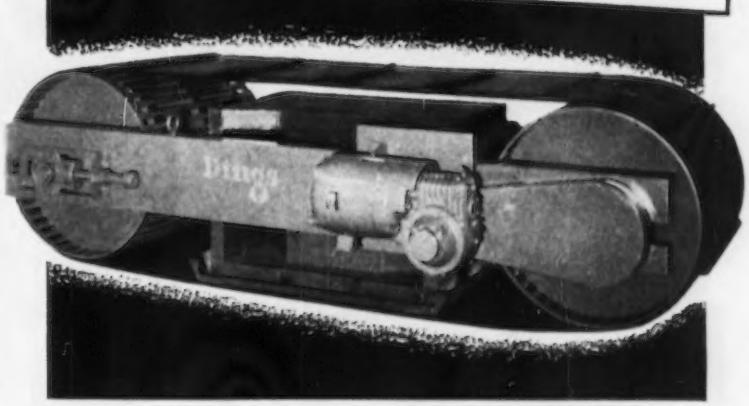
An east drift on the fissure vein is now in progress. It is estimated that the zone of best mineralization, as indicated on the adit level, will be reached in about 180 ft of work.

Silver Buckle Mining Co. operates the property under a profit-sharing agreement with Vindicator Silver-Lead. The project is being done under a $229,500 DMEA contract.

ILLINOIS-KENTUCKY

Hicks Creek Fluorspar Mining Co., mining the Douglas property, near Eichorn,

Here's Positive Self-Cleaning
TRAMP IRON PROTECTION



THE DINGS *IN-LINE*
RECTANGULAR MAGNET

● DINGS *IN-LINE* RECTANGULAR SELF-CLEANING MAGNETS pull tramp iron of any shape out of belt or oscillating conveyor burdens traveling at any speed. They do the job where even the largest diameter magnetic pulley would fail—where burden trajectories are almost horizontal.

● Iron extraction with the Dings IN-LINE is parallel to burden travel and at the same speed. That's why this magnet can handle tramp iron such as long iron rods with ease.

● The IN-LINE is a self-cleaning version of the Dings RM rectangular magnet—the most efficient ever designed for removing tramp iron from conveyor belt burdens. Available in standard sizes to meet almost any belt speed, width or burden characteristic requirements.

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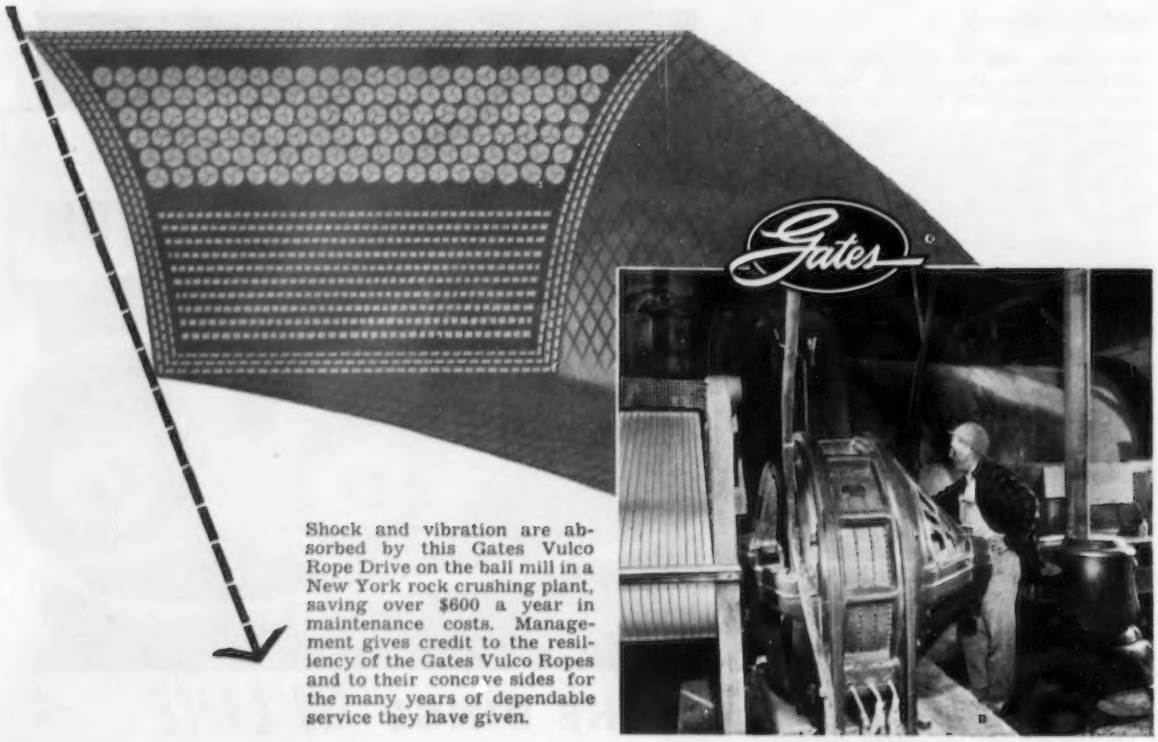


Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over $600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 25-9

GATES VULCO ROPE DRIVES

Ill.—Ky. *(Continued)*

in Pope County, Ill., elected the following officers at its recent annual meeting: John C. Humm, Harrisburg, president; Clyde Flynn, Jr., secretary, and Myrell Conn, treasurer, both of Hardin County. While Hicks Creek production previously has been sold locally, the company now plans to sell on the market.

New Jersey Zinc Co., which leased more than 10,000 acres in Hardin and Pope Counties during recent months in an exploration program, has permanently closed its Harrisburg, Ill., field office.

MINNESOTA

Diamond drilling program at the Section 30 iron mine, near Ely, carried on for several months by the Minnesota Ore division of the Jones & Laughlin Steel Corp., has been concluded pending a study of the exploration work done thus far.

W. S. Moore Co., Hibbing, is considering plans for a heavy media plant in the Nashwauk-Keewatin area of the Mesabi Range. Plant will be located on the leased O'Brien property about 1 mi southeast of Nashwauk, and will be designed to serve several iron-ore properties in the area.

During the 1954 shipping season, Cleveland-Cliffs Iron Co. shipped 5,131,514 tons of iron ore from eleven mines in Michigan and six mines in Minnesota. The company shipped 8,321,927 tons in 1953, 7,510,215 tons in 1952 and 9,070,935 tons in 1951.

M. A. Hanna Co. is presently engaged in stripping operations at fourteen of its properties in Minnesota. According to present plans, this work will involve moving a grand total of about 13-million cu yd of stripping material. On the Mesabi Range, the properties stripping this winter are: Enterprise, Douglas, Weggum, Morton, South Agnew, Mississippi group, and the Cooley district mines. On the Cuyuna Iron Range, the operations actively stripping are: Hillcrest, Extension, Huntington, Louise, Maroco, South Hillcrest, Portsmouth, and Yawkey.

Rhude & Fryberger, Hibbing, Minnesota, shipped a total of 464,828 tons of iron ore from three mines in Minnesota during 1954. By mines, the shipments were: Boeing, 355,792 tons; Troy, 53,327 tons; and Pennington, 55,709 tons. Boeing and Troy mines are on the Mesabi Range, and the Pennington mine is on the Cuyuna Range.

M. A. Hanna Co. shipped a total of 10,360,610 tons of iron ore from its mines in the Lake Superior district during 1954. The company shipped 15,675,074 tons in 1953, 11,668,627 tons in 1952, and 13,677,204 tons in 1951. The 1954 shipments came from 39 mines on the Mesabi Iron Range, 12 mines on the Cuyuna Iron Range, and one mine in Fillmore County, all Minnesota, plus 4 mines on the Menominee Iron Range, one mine on the Marquette Iron Range, and one mine on the Gogebic Iron Range, in Michigan.

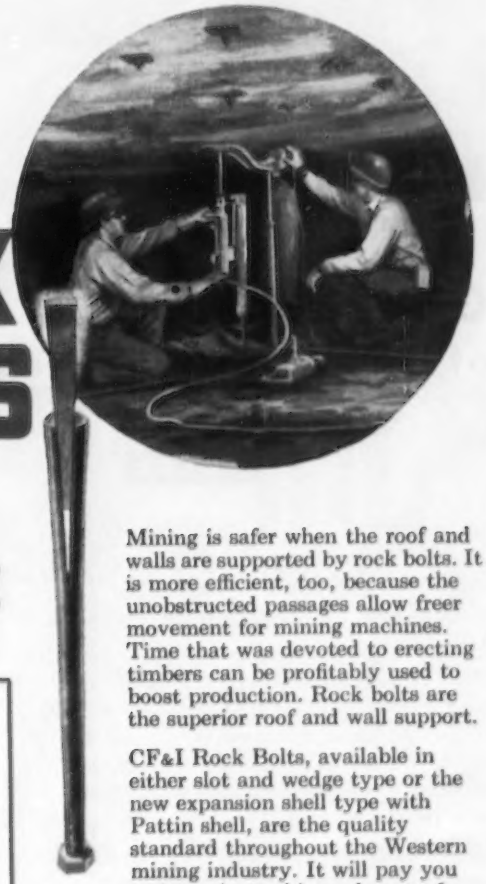
R. T. Elstad, president of the Oliver Iron Mining division of U. S. Steel, announced that all Oliver employees returned to a five-day, 40-hr work week, effective Jan. 3. A 32-hr work week had been in effect at most Oliver properties since October. Winter work at the Oliver mines involves stripping and repair in preparation for the 1955 ore season.

During the 1954 shipping season, Pickands, Mather & Co. shipped a total of 9,149,277 tons of iron ore from its mines in the Lake Superior district. In Minnesota, the company operates eleven mines on the Mesabi Iron Range and one mine on the Vermilion Range. In Michigan, the shipments came from five mines on the Gogebic Range, and three mines operated by Pickands, Mather on the Menominee Range.

The 1954 shipment figures by Pickands, Mather compare with 14,390,028 tons shipped in 1953; 12,448,217 tons shipped in 1952; and 14,217,634 tons shipped in 1951.

CF&I

ROCK BOLTS for safer mining



Mining is safer when the roof and walls are supported by rock bolts. It is more efficient, too, because the unobstructed passages allow freer movement for mining machines. Time that was devoted to erecting timbers can be profitably used to boost production. Rock bolts are the superior roof and wall support.

CF&I Rock Bolts, available in either slot and wedge type or the new expansion shell type with Pattin shell, are the quality standard throughout the Western mining industry. It will pay you to investigate this modern roof and wall support. Write for full information.

EXPANSION SHELL TYPE ROCK BOLT WITH PATTIN SHELL

CF&I Steel Products for the Mining Industry

Grinding Balls • Grinding Rods • Wickwire Rope
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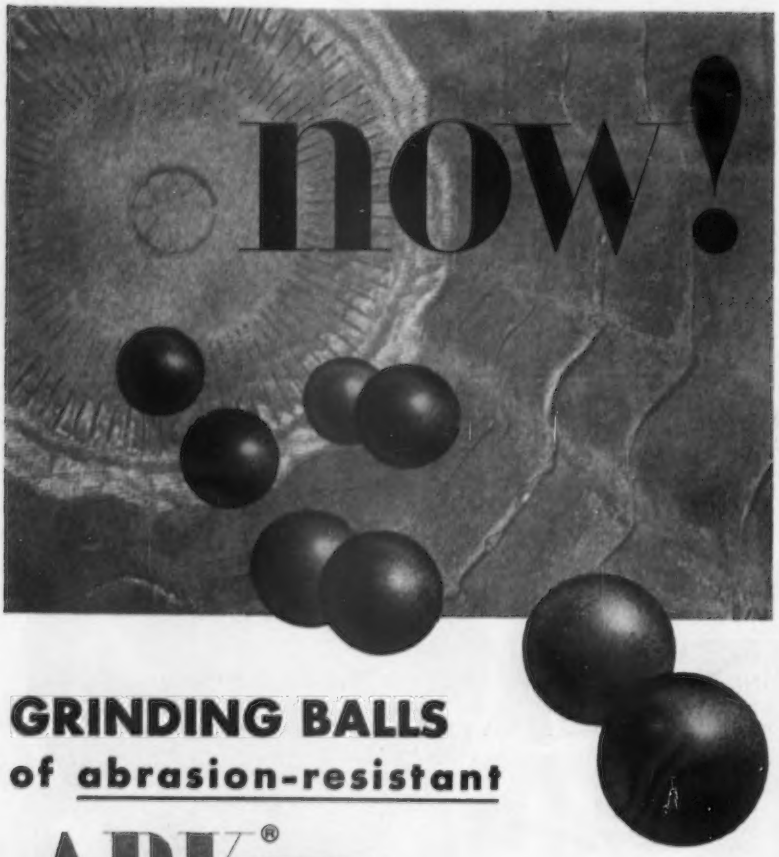

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Now—for the first time—you can get grinding balls made of *abrasion-resistant* ABK Metal.

These nickel-chrome iron balls feature the same controlled structure that enables ABK Metal mill liners, pump parts, etc., to last up to 3 to 4 times as long as parts made of so-called "abrasion-resistant" steels of the same rated hardness.

Surface uniformity is assured by careful tumbling and rigid inspection. With a rated hardness ranging from 500 to 700 Brinell, ABK Metal Grinding Balls are regularly produced in diameters of ⅝" to 1¼". Other sizes upon request.

ABK Metal Grinding Balls are available from foundries in the East, Midwest, and far West.

For full information on ABK Metal Grinding Balls, Mill Liners and other products write to American Brake Shoe Company, Dept. A, 230 Park Avenue, New York 17, N. Y.

AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION

230 Park Avenue, New York 17, N. Y.

2934

Minnesota

(Continued)

Minnesota Ore division of the Jones & Laughlin Steel Corp. has announced that the Schley and Pettit iron mines, located just east of Gilbert, on the Mesabi, will be re-opened soon. Mines have been closed since March 1954. Schley mine is a developed open pit, and the Pettit mine is a partially-developed open pit where stripping will be necessary preparatory to iron-ore shipment.

Oliver Iron Mining division of U. S. Steel Corporation shipped a total of 25,231,883 tons of iron ore from its mines in the Lake Superior district during 1954. This total was down from the record figure of 44,124,717 tons in 1953, and compares with 34,456,449 tons in 1952 and 43,992,961 tons in 1951. The 1954 shipments came from one underground mine on Michigan's Gogebic Iron Range; three underground mines on Minnesota's Vermilion Iron Range; and twenty mines on the Mesabi Iron Range, in Minnesota.

Dr. Louis A. Panek, of the Applied Physics branch, USBM, is giving the Warren lectures at the University of Minnesota School of Mines and Metallurgy for three months, starting Jan. 3. The lectureship was established by Mrs. Alice R. Warren-Gaarden, former member of the University board, in memory of George H. Warren, pioneer developer of the state, and Frank M. Warren, leading mining engineer and authority on iron ore occurrence.

Dr. Panek

The Warren lectureship was established to promote effective teaching and education in the mineral industry field by bringing outstanding American and foreign lecturers to the University.

Dr. Panek, an authority on the design of mine openings, has been actively engaged in research on mining methods for many years. He is on leave of absence from the College Park, Md., branch office for the lecture period.

MICHIGAN

White Pine Copper Co. poured its first copper from the newly-developed mine in the upper peninsula February, Morris F. LaCroix, president of White Pine and of Copper Range Co., the parent company, announced.

White Pine reportedly contains 309-million tons of developed ore, averaging 1.1% copper per ton.

Orebody development started in 1952 and has cost $80-million. Rated capacity is 37,500 tons annually. Construction of the development was handled by Turner Construction Co., New York; architectural design and engineering by Western-Knapp Engineering Co., San Fran-

Bottom-Dump Coal Haulers have capacities of 25, 32 and 40 tons . . . engines from 190 to 300 h.p. . . . dual or large single drive and trailer tires . . . torque converter and Torqmatic drive or standard transmission.

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GENERAL MOTORS CORPORATION
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Higher Availability
More Tonnage
Lower Costs

On scores of mining operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the bituminous and anthracite fields. If you're interested in cutting your hauling cost for coal, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

Rear-Dump models are available in 10, 15, 22, 34 and 50 ton capacities with engines of 165 to 600 h.p. . . . semi-rigid or spring mounted drive axles . . . standard transmissions or torque converters and Torqmatic drive.

CABLE ADDRESS: YUKLID

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Michigan *(Continued)*

cisco, Stone & Webster, Boston, and Pace Associates, Chicago.

Blueberry Iron Mine, located 7 mi west of Ishpeming, on the Marquette Range, was permanently closed Dec. 3, 1954, because of the exhaustion of the ore reserves. Property has been operated since 1933 by North Range Mining Co.

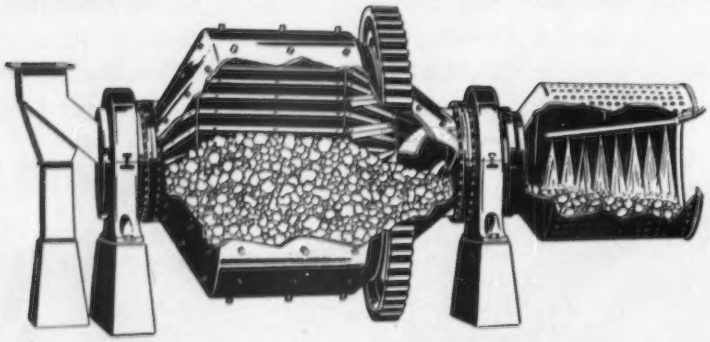
Ford Motor Co. began operations in 1928 and operated the property until it was leased to North Range.

Underground workings have been carried to a depth of 2,000 feet, at which point the orebodies become small and non-commercial. During the period of the mine's operation, 6-million tons of ore were hoisted.

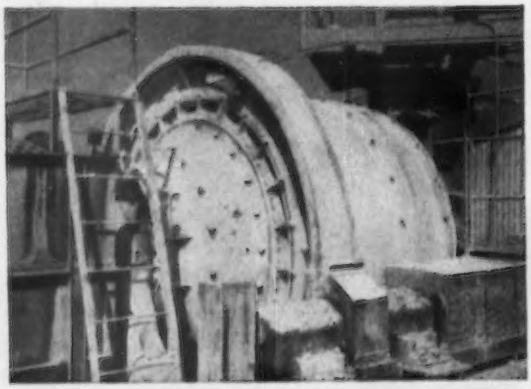
New surface plant of the Cannon Iron Mine, Stambaugh, of the M. A. Hanna Co. is completed, and the shaft sinking is nearing its objective of 1700 feet. This is one of the largest outlay investments in recent Michigan iron mining.

Inland Steel Co. shipped 1,547,001 tons from its mines in the Lake Superior district during the 1954 iron ore shipping season. Of this total, 1,155,630 tons came from five mines in Michigan, two on the Marquette Range and three on the Menominee Range, and two mines on the Cuyuna Range, in Minnesota.

HARDINGE SCRUBBERS FOR PIT-RUN MATERIALS



Large diameter, short length trunnions permit chute feeding of unsized ore and rock at rates up to 600 tons per hour.
The mass loading and ball-mill action in the scrubber quickly and completely slurries the clay and dirt, permitting ready separation on washing screens or trommels.



View of a 10' x 66" Hardinge Scrubber cleaning crushed dolomite in a California plant.

BULLETIN 37-A-1

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MONTANA

Minerals Engineering Co., Grand Junction, Colo., which is operating tungsten mines and mill near Glen, Beaverhead County, and which has been leasing the Brown's Lake properties of American Alloy Metals, Inc., has purchased all the stock and assets of the last-named company. According to Blair Burwell, president, additional equipment is being installed in the mill at Glen to increase production. The tungsten mines near Glen will produce at the rate of 20 thousand tons per month.

Spokane Regional Office of the Defense Minerals Exploration Administration announced the granting of exploration contract loans with two Montana mining companies. A $26,110 contract for lead-zinc-copper exploration work in Jefferson County was granted the Elkhorn Consolidated, Inc., and the Boss Mines, Inc. of Helena. C. L. Hewitt, president, will undertake a $26,146 lead-zinc exploration contract in Cascade County, Montana.

NEVADA

Drilling has uncovered 500,000 tons of 2½% oxide and sulphide copper ores at the old Copper Cliffs properties 15 mi west of Yerington.

E. R. Lund, Salt Lake geologist, said that ore should run $30 a ton copper and $3 a ton silver-gold. Oxides are 100-300 ft in depth, sulphides below that.

R. D. Morris, Gardnerville, Nev., has a lease pulling a straight 10% royalty on the 24 claims covering the properties. It was his drilling which outlined the orebody, Mr. Lund said.

Double O Timber and Mining Co. will shift from diamond to churn drilling at its uranium mine in the Kings River district 75 mi north of Winnemucca.

Albert Simrak, general manager, said a diamond drilling program conducted by Boyles Bros., Salt Lake City, has been carried out, with some holes as deep as 250 ft, but they plan to go 300-350 ft.

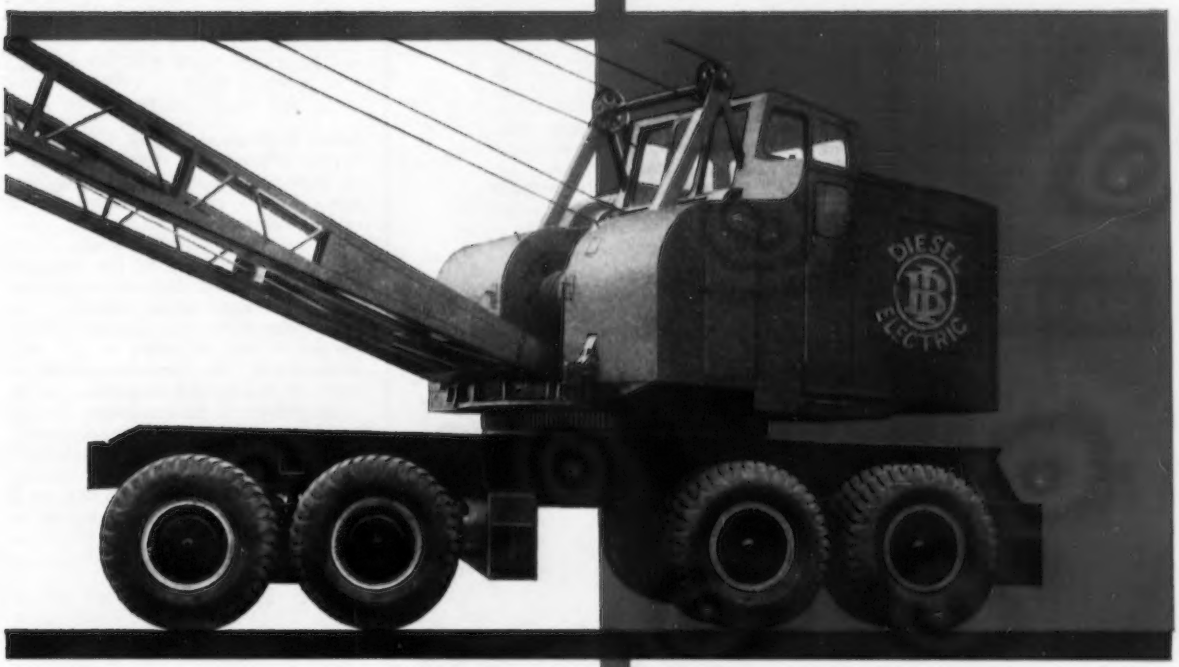
John Olson and Fred Bennett are shipping tungsten concentrates from their mill east of Fallon. Ore is being dug from an open-pit mine where eight men are employed. Olson and Bennett bought the scheelite property from Cye Cox several months ago and constructed the mill at the site of the old Sand Springs stage station on ground bought from Summit King Mines, Inc. The mine is south of the recently vacated Summit King mine and mill. Shipments are being made to the Vanadium Corp. plant near Bishop, Calif.

Shipment of uranium ore was made on Jan. 14 from the Moonlight mine in

announcing

America's first and only rubber-tired diesel electric cranes

electric travel, electric rotation!
25 to 60 ton capacities!



Designed and built by Industrial Brownhoist Corporation for mines, quarries, railroads, steel mills, the lumber industry and other large manufacturing plants that require mobile materials handling equipment in heavy duty capacities, America's first Diesel Electric Wagon Crane is now in production. Available in capacities from 25 to 60 tons, the new wagon crane will be equipped with dynamatic clutch, anti-friction bearings at essential points, and power steering. It employs electric travel and electric rotation. Mounted on a 12-wheel crane carrier capable of speeds up to 8 miles per hour, the unit can be operated by one man from easy-to-reach crane and carrier controls. Rigorous tests indicate that the new machine provides economical operation and insures added savings of time and labor in heavy duty materials handling work. For complete details, consult a Brownhoist representative or write us today.

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Sauerman installations provide economical handling of a wide variety of bulk materials, from bauxite to zinc ore . . . at rates ranging from 10 to 800 cu. yds. per hr. Storage areas range from a small bin to ten acres or more.

Quick change from stockpiling to reclaiming is accomplished by unclamping and re-attaching the operating cables so as to turn the bucket around when the power is applied. Non-caving or free-flowing materials are handled with equal efficiency. The operator can be located in a safe cab overlooking the work area. Many Sauerman installations are remotely operated through air or hydraulic controls.

Let Sauerman engineers show you how to use your storage area to its fullest extent. Send for Catalog E, *Bulk Storage by Power Scraper* and *32 Tested Methods For Handling Bulk Materials*. Request the following Field Reports:

FR-221 Storing Sand and Gravel
FR-223 Unloading Ships and Barges
FR-224 Handling Ore with Drag Scrapers
FR-225 Robot Material Handling

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THE WORLD'S MOST USEFUL VEHICLES

Nevada *(Continued)*

Humboldt County to the American Smelting and Refining Co. plant at Grand Junction, Colo. It was the first shipment of uranium made from northern Nevada.

Value of copper produced in the state during 1954 was highest ever recorded, according to a preliminary report released by the Bureau of Mines. It was worth $42,548,220, up 22% from the previous year.

Metallic minerals as a group also showed a 22% upswing, bringing in a total of $75,559,000. Mercury production rose 113%, with value during 1954 set at $1,343,660. Tonnage of manganese ore was twice that in 1953, 108,900 short tons. Value of tungsten concentrates was $20,357,000, up 48%.

On the decline were gold, $2,741,865, down 31% despite increased output of by-product gold from copper ores; iron ore, $2,112,500, down 20%; silver, $532,966, down 16%; lead, $935,680, down 18%, and zinc, $255,300, down 83%.

James E. Hogle, president, Consolidated Eureka Mining Co., reports production of high-grade lead-silver ore from the firm's Eureka properties is running at rate of 400 tons monthly.

He said the orebody discovered last July in the footwall of the Diamond Fault occurs as a replacement of dolomite in the Hamburg formation.

It appears the firm is in ore 100 ft upward to the extension of the Diamond Fault. Ore continues downward with out any, as yet developed, cut-off.

By virture of the discovery, Consolidated Eureka reported first profits in last 20 yr. They amounted to $79,226 last year. Shipments during the last months of 1954 amounted to 943,664 lb lead; 62,176 oz silver and 935.38 oz gold.

NEW MEXICO

Anaconda Copper Mining Co. has joined the list of companies using helicopters in uranium exploration.

A Bell Aircraft Model 47G helicopter, equipped with a scintillometer, is operating out of Grants, retracing surveys made earlier by airplanes. Jack Knaebel, general manager of Anaconda's New Mexico operations, said recordings taken from the helicopter are in some respects more detailed and precise than those from other aircraft.

Four Corners Uranium Corp. has acquired properties of Largo Uranium Corp. and General Uranium Corp., both New Mexico corporations, in an exchange of stock.

The transaction marked the first venture of Four Corners into New Mexico, although the company has properties in Colorado, Utah and Wyoming.

An extensive drilling program is planned on McKinley County land near Fort Wingate arsenal which Four Corners obtained through the deal.

Plan for a $1 million-plus expansion pro-

gram at the potash division of International Minerals & Chemical Corp., in Carlsbad, N. M., have been announced by A. Norman Into, vice president in charge of the potash division.

Expansion of the Carlsbad plant will increase its capacity to produce potassium sulphate by 40,000 tons per year, Into said.

Carl A. Arend, manager of IMCC's Carlsbad operation, said engineering on the expansion program is well underway and all major items of equipment needed for the project have been ordered.

Work on construction, with Stearns-Roger Mfg. Co. in charge, is to begin immediately and will be completed in time for the additional potassium sulphate to be available for the coming fertilizer season.

New Mexico now is producing from the Laguna-Grants area alone at least 10% of the uranium ore coming out of the Colorado Plateau, Lowell Hilpert, USGS geologist, says. He added that there is a great potential for new discoveries in the area.

NORTH CAROLINA

North Carolina State Board of Conservation and Development at a meeting at Raleigh Jan. 25 took steps to give the State percentage royalty payments for all ilmenite mined on state-owned properties.

State now gets a flat fee per ton, regardless of market price, and the board directed Ben E. Douglas, department director, and Dr. J. L. Stuckey to discuss with ilmenite interests the possibility of mining the mineral on a royalty basis instead of a flat fee.

Ilmenite is being mined commercially in North Carolina principally in the Albemarle and Pamlico Sounds.

Pacific Tin Consolidated Corp. of New York City, is entering feldspar mining and processing in the Southern Appalachians, having agreed to purchase Feldspar Flotation Corp. of Spruce Pine, Feldspar Milling Co., Burnsville, North Carolina Feldspar Corp. of Erwin, and Appalachian Minerals Company of Monticello, Ga.

The four feldspar firms are owned by C. P. Rogers of Tryon, N. C., and W. F. Deenen of Johnston City, Tenn.

Carroll P. Rogers Jr., manager of the Feldspar Flotation Corp., will be general manager of the four plants under the new ownership, and there will be no changes in personnel or policies.

The four firms employ about 175 persons, and produce about 25% of U. S. ground feldspar.

OREGON

C. G. Cafarelli, Salt Lake City, and J. H. Kinsella, Belview, Idaho, have purchased the Burt Hayes interest in the Haggard & New chromite mine near John Day. They plan enlargement of both mining

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THE WORLD'S MOST USEFUL VEHICLES

Oregon *(Continued)*

and milling capacity. Property has been a consistent shipper to the Grants Pass GSA chrome depot since Hayes reopened the property in early 1953. Ore mills about 2 to 1 to yield a concentrate averaging nearly 50% Cr_2O_3 with a 2.95:1 chrome-iron ratio.

Fractures of the massive chromite shipped from the McTimmonds Bros. operations at Red Mountain, southwest of Ashland in a new claim location area, are unusual in that they are coated with malchite, a hydrous copper carbonate. The property's shipments to the GSA depot have assayed at 55.57% chromic oxide with a chrome iron ratio of 3.92 to 1 and the latest shipment brought $165.28 per ton.

Chrome properties on the Chetco divide in Curry County, known as Wonder, Daily Dozen and Roy Jackson group and Bowser properties, have been leased by Tulare Bros. Mining Co., Gold Hill, Ore., from J. R. Holman, Walter B. Freeman and LaVern Twombley.

Wesley Pieren and Antone J. Nielsen of Evergreen Mining Co. began stripping overburden in December preparatory to placer gold operations on Galice and North Fork creeks, where the company holds 14 claims. Properties are in Josephine County.

Hanna Nickel Smelting Co. operation at Nickel Mountain development near Riddle had progressed by January to a point where two ferro-nickel furnaces were in operation and a silicon furnace was producing ferro-silicon for charging the ferro-nickel smelters. Four furnaces are contemplated. Company representatives at the plant, which is the first U. S. commercial production of nickel from domestic ore, have been secretive about tonnages and detailed information.

Eastern Oregon Mining and Mineral Assn. voted in late January to place itself on record favoring development of a large hydroelectric dam on the Snake River by the U.S. Government. Norman A. Phillips, president, reported the mining district of eastern Oregon and western Idaho needs a source of low cost electric energy plus the economical water transportation such a development would afford. The association named John Arthur, Baker, a consulting geologist. Arthur is a mining engineer.

Oregon House of Representatives tax committee has introduced with its endorsement a bill to levy a severance tax on oil, gas and minerals taken from Oregon land.

Rep. Loran Stewart, Cottage Grove, chairman of the committee, explained Oregon, which has no producing gas or oil wells, should enact the levy because it would be harder to pass if the legislature waits until oil or gas is discovered in commercial quantities. The bill would provide also a 2% levy on minerals.

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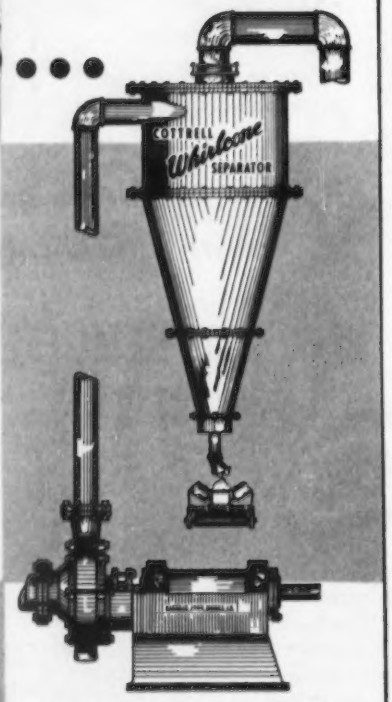

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UTAH

Natomas Co., California gold dredging and land development firm, plans exploratory work in the spring on some possible uranium bearing ground in the Utah-Colorado Plateau.

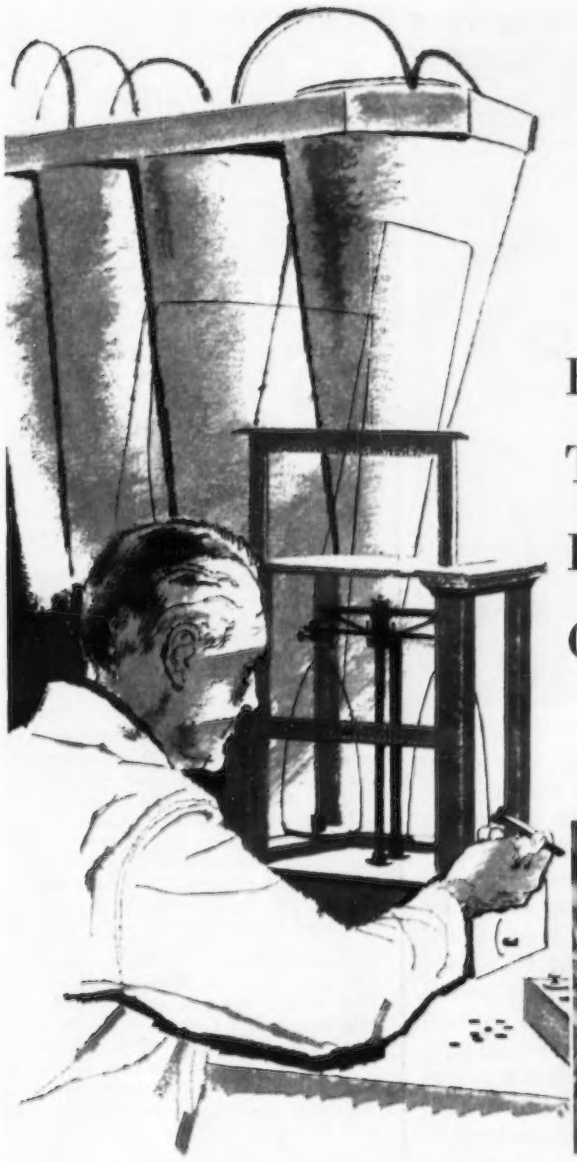
Company officials reported in Sacramento, Calif., that a lease and option to purchase mineral rights on 6,000 acres has been acquired. The property is 24 mi west of Blanding, San Juan County.

Land lease and option was obtained, it is announced by the company, from a group of owners headed by the Wooden and Webster interests.

Mine production of phosphate rock hit a new all time high during 1954 of 71,000 tons. Virtually all was from underground operations of San Francisco Chemical Co. in Rich County.

Re-opening of the Tooele lead smelter, International Smelting & Refining Co., is projected within four or five months or a shorter period, officials say. It all depends on how fast stockpile of ore from Darwin, Calif., mines and lead-zinc producers in Utah and Nevada mounts up.

Nearly 40 mergers are proposed among



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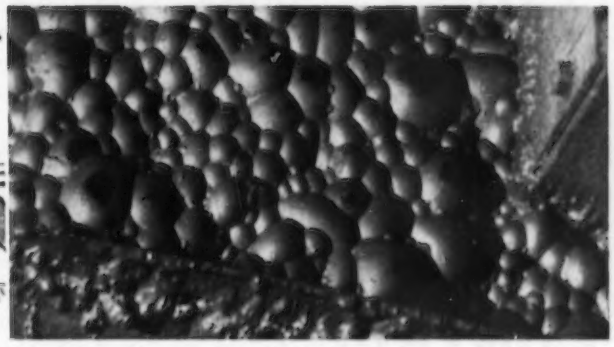

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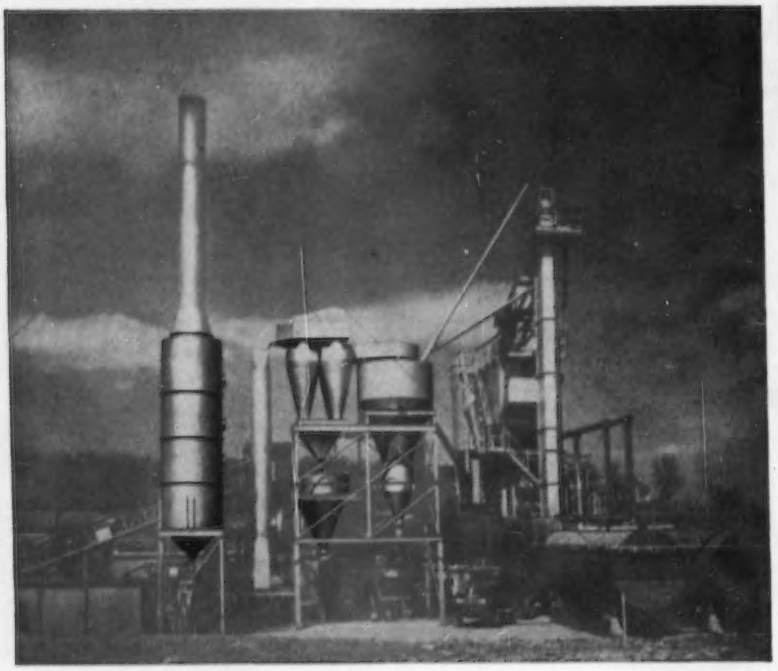

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Utah *(Continued)*

uranium companies operating out of Salt Lake City.

Largest single proposal is that of the Floyd B. Odlum group controlling Federal Uranium Corp., a Utah charter firm. There now has been established the Federal Uranium Corp., a Nevada corporation, into which will be merged Federal Uranium (Utah); Kentucky-Utah Mining Co.; Utida Uranium; Howell Mining Co.; Interstate Uranium and Western States Uranium. Additional mergers are planned. These firms all have mines on Colorado Plateau, with exception of Howell, whose properties at Marysvale, Utah, are operated by Vanadium Corporation of America.

Croff Oil Corp. has purchased for $175,000 the Corvusite uranium-vanadium mine on northeast end of Beaver Mesa. One of the oldest uranium-vanadium properties in the U. S., production from the Corvusite dates back to the old radium days. Since 1948, the mine has produced $330,000 worth of uranium-vanadium ores. Original owners were Roy Stone, Olathe, Colo., Woodward Brothers and Tom Anderson, Montrose, Colo. Croff bought the 33 claims from James F. Martin & Co., a Grand Junction, Colo., partnership.

McFarland and Hullinger, Tintic district contractors, have been shipping uranium ore from the Maybe Mine, Red Canyon, White Canyon District, San Juan County.

One of the most modern uranium operations in the region, the Maybe leasers had to drive 1900 ft to hit first ore in the Shinarump formation. They now report drifting and cross-cutting on a deposit expanded by development work.

El Dorado Mining Co. has acquired a long-term lease in Butterfield Canyon from United States Smelting Refining & Mining Co. and Combined Metals Reduction Co. Whitney C. Hansen, El Dorado president, says the firm will "engage in the first trackless mining in the Bingham district" in development of lead-silver-gold deposits.

Merger of the Lead Institute and the Zinc Institute is being discussed in Utah mining circles. The successful cooperation of the two elements of the mining industry in the National Lead and Zinc Committee headed by Otto Herres, Salt Lake City, is listed as a reason. Search is now for a man to run the combined operations.

Newmont Mining Co., which entered the prospect for uranium in the Moab district late last year, has now extended its search into the White Canyon district of San Juan County near Hite.

One of the hottest areas in the state, the district has seen claims optioned by Cerro de Pasco and activities by Standard Ore & Alloys. Both Newmont and Standard are operating through subsidiaries.

Utah State Land Board announced it will allow no more than a maximum 5% over-riding royalty on mineral leases on state lands.

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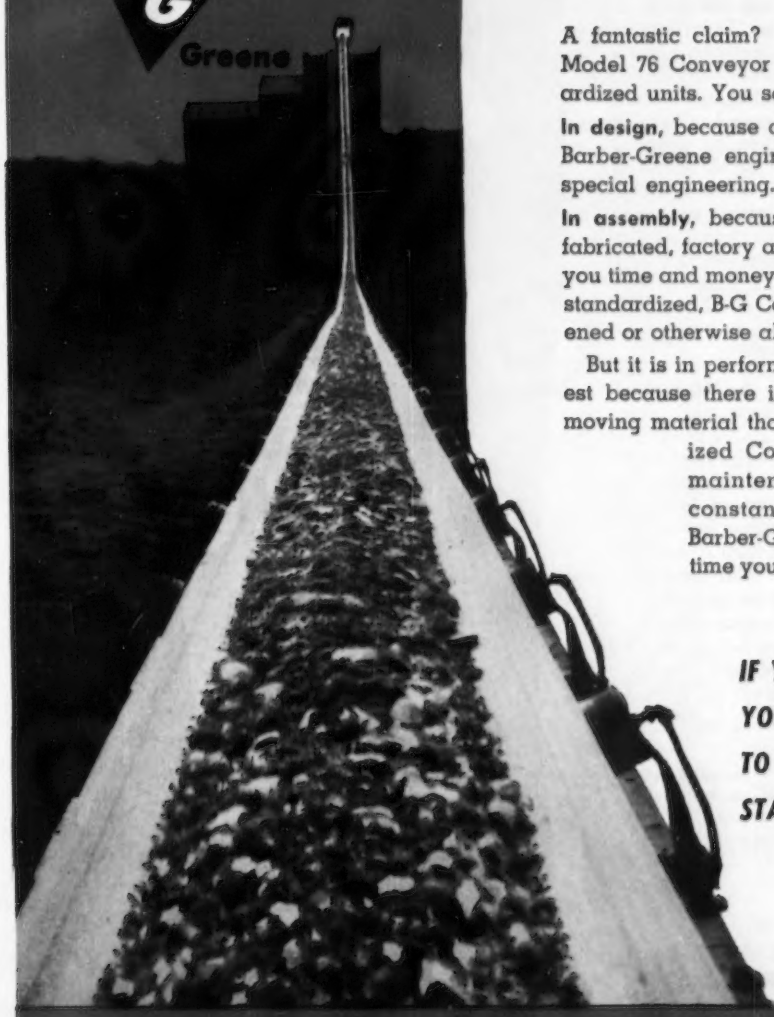

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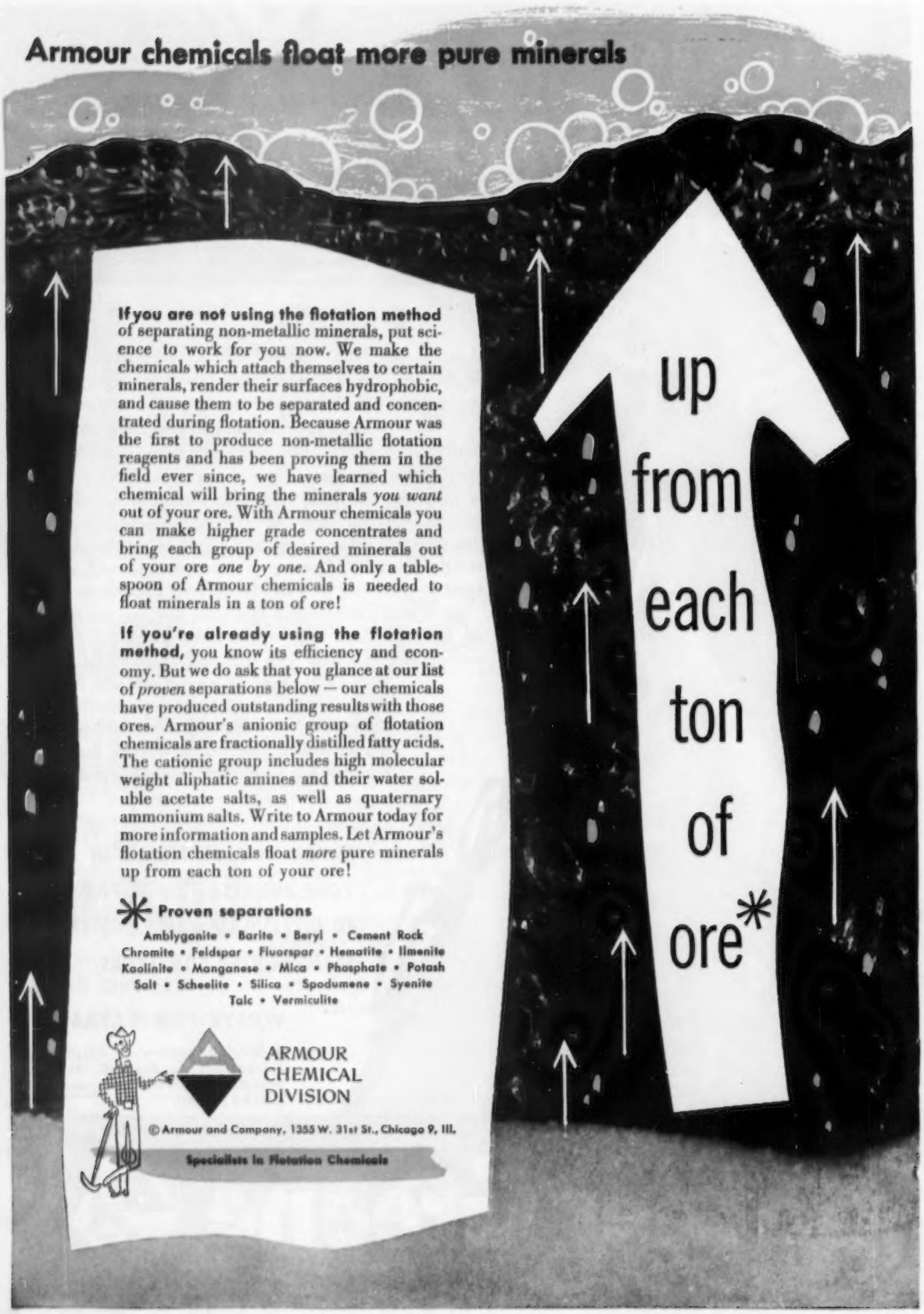

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Utah *(Continued)*

The edict, concerned mainly with uranium leases issued by the state, seeks to remove "uneconomic" burdens from shoulders of those eventually mining on the leases. State itself has been criticized by the uranium committee, Utah Mining Assn., for inflexible 12½% basic royalty it extracts from mining leases.

Committee seeks a negotiated lease similar to that applying on nonferrous metals mined from state lands.

Midvale smelter, United States Smelting Refining & Mining Co., has received shipments of high grade lead-silver ore from leasers on the United Idaho Mining Co. properties at Gilmore, Ida.

Charles Plum, Leadore, Ida., and the Henderson Bros., Gilmore, present settlement sheets showing ore running 31% lead; 16 oz silver and minor amounts of gold and zinc. The properties have been developed under a DMEA loan.

Last shipments from the Gilmore mining district were made in pre-Depression days. The properties were originally developed in the early 1900's.

Homestake Mining Co. is shipping uranium ore from both its Little Beaver and La Sal leases in the Big Indian district, San Juan County.

The shipments to the Monticello mill of the AEC are strictly from development ore. However, mining on a substantial basis is scheduled to commence shortly at the Little Beaver property.

Major development work (tunnel extension through ore) is completed and drifting and cross-cutting is under way. Homestake is working its own crews at both properties. Contracts with Centennial Development Co. have been completed for shaft sinking at La Sal mine and the Little Beaver tunnel.

Seagull Uranium Co. reports shipment of 250 tons of uranium ore to the buying station at Thompsons operated by United States Vanadium Co., from carnotite properties in Grand County. Shipments average $39 a ton, according to settlement sheets.

New Moab sampling and buying station operated by American Smelting and Refining Co. for the AEC was slated to commence full-scale purchases of A-ore on Feb. 1.

Up to the present, Asarco has been buying ores only from the Utex Exploration Co. (Charles A. Steen and leasers) on a provisional basis. Some 11 to 12 other major producers have been shipping ore to other buying stations and/or mills on the Colorado Plateau, from their Moab area mines.

Ore will be received at the station daily through Friday under provision of existing AEC buying schedules.

Bob Barrett, early associate of Charles Steen, who sold his interest in Steen's Utex company a year ago, has paid $200,000 for the Wig and Dissipation claims held by Dennis Byrd, owner of the Byrd Aviation Co. of Moab.

Barrett had held an option on the

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Utah *(Continued)*

claims for a year. They adjoin the Big Indian Valley claims now being developed by the Homestake Mining Co.

Amuranium Corp., which holds more than 2,200 acres in the Lisbon Fault-Big Indian area in San Juan County and has a field office in Moab, has obtained a Defense Minerals Exploration contract under which the Government will pay up to 75% of a $147,650 drilling program.

Fifty-four holes are to be drilled to an average depth of 1,000 ft.

Central Western Petroleum Corp. of Fort Worth, Texas, entered the Plateau uranium field with purchase of 464 claims in San Juan County, Utah, and San Miguel County, Colo.

The claims had been held by a group of 27 owners. Dana T. Merrick, president of Central Western, estimated ore reserves at more than $12-million.

Bob Richardson, consulting geologist and engineer of Denver, Colo., will supervise mining operations for Central Western.

An injunction suit asking that Hidden Splendor Mining Co. be restrained from drilling on property allegedly owned by Climax Uranium Co. has been filed by Climax in Emery County district court. Claims involved are in the vicinity of the Delta mine, discovered by Vernon Pick and now owned by Hidden Splendor.

Marvin Kay, vice president of Climax, said the title dispute arose because present Federal and state mining laws are difficult to apply to the uranium industry.

"Conclusion of the several title suits now in the courts will benefit the entire uranium industry," Kay said. "We expect the questions regarding mining property rights to be greatly clarified by the courts."

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J. C. (Jack) Burgess (left), president of Atlas Uranium Corp., and **Albert F. Enyart,** president of Paramount Uranium Corp., inspect chunk of ore from Atlas' strike on One Chance Claim of Wade Shupe Lease, southeast of Moab, Utah. One Chance is about 1 mi south of Yellow Circle mine.

Atlas miners hit a 4-ft vein of carnotite in the Morrison after drifting 132 ft toward the nearest of five drill holes, each of which had encountered ore. Burgess says the discovery supports the contention that most future strikes will be through drilling exploration. His company owns its own Mayhew rig, used both in drilling on Atlas' 128 claims in Utah and Colorado and for contract drilling for other companies.

Restoration to the public domain of 7,840 acres in the Swazy's Flat area of Emery County has been announced by the AEC.

The restoration does not include 9,560 acres of adjacent lands segregated in March 1954.

Continental Uranium Co. expanded its uranium holdings with purchase of the 43 Blue Lizard group claims in White Canyon for $6-million, with a $1-million cash down payment.

Sellers were Preston Redd of Blanding: his brother, Robert Redd; their father, J. Wiley Redd; Keith Redd, and Leon and Don Adams of Monticello. Under the agreement, Preston and Robert Redd will be retained to manage the mine during a transition period.

Charles Steen has purchased a controling interest in Standard Uranium Corp., from industrialist Joseph W. Frazer, who or-

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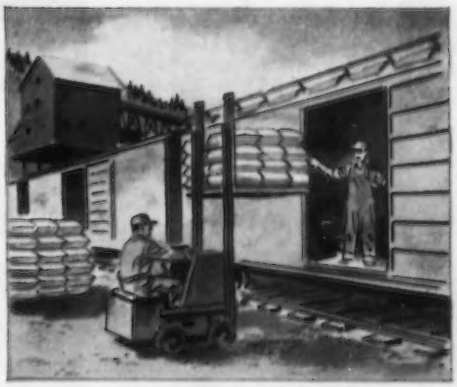

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Utah *(Continued)*

ganized Standard early in 1954 to work the Big Buck property adjoining Steen's Utex holdings.

Standard is now shipping ore from its Big Indian claims and expects to ship more than 30,000 tons by May 30, representing about $1-million in revenue.

Frazer said he had sold Steen 400,000 shares of common stock, and resigned as president of Standard. New president is William R. McCormick, Steen associate.

WASHINGTON

Chewelah Copper Co. which has a $63,000 exploration contract with the DMEA for work on its properties northeast of Chewelah in Stevens County, started diamond drilling operations on the 1,000-ft level early in January, according to Frank H. Mitchell, company mining engineer. A 250-ton ore bin has been built at the mine and ore is being taken from the 400-ft level and also from the 500-ft level of the Amazon property.

Ore from the 400 level is being trucked 28 mi to the Bonanza lead mill's 750-ton ore bin. Mill was purchased from E. B. Gibbs of Colville in October, and work there will be on a 1-shift basis for the present. It is planned later to run the 200-tpd capacity mill on a 3-shift basis.

Production at Northwest Magnesite Co.'s Chewelah plant, though 60% lower in 1954 than in 1953, has a brighter outlook at present, according to Howard Ziebell, general manager. Increased steel industry activity has upped demand for refractory magnesite in the last two months.

Kaiser Aluminum & Chemical Corp. added 100 men to its payroll at the Trentwood rolling mill during January. Steady level of sales, adequate power supplies, and large orders of a "special" nature were given as the cause of the increase by Marvin L. Lee, Trentwood works manager.

Operations at the Grandview zinc-lead mine near Metaline Falls, which is under lease to American Zinc, Lead & Smelting Co., are getting back to normal after a 5-month shut down in a contract dispute, according to Karl Jasper, president of Grandview Mines. Production was resumed on Jan. 3. Output was about 700 tons per day at the time of the close down.

In driving the new 500 level at Grandview, Dale I. Hayes' Gismo, a self loading transport, will be put to a new use—loading cars and then riding on one of them away from the working face. Gismo backs on to the cars via a ramp, ramp folds up and area is cleared so that drilling may be resumed. New level is to be 11 ft high and 11 ft wide. It is expected that removing a 100-ton round from the excavation will take less than an hour.

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3. Operators connect up Du Pont "Nitramon"® Primer with "Primacord," then lower it. Also relatively insensitive to the various hole hazards, this Primer can be counted on to do its job.

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Washington *(Continued)*

contract with Pioneer Drilling Co. of Moab, Utah, for drilling its uranium claims in San Juan County, Utah, according to W. T. Anderson, secretary-manager and R. R. Weideman, mine superintendent. There has been some production proving the presence of uranium and vanadium. The Morrison sandstone is said to underlie nearly all the Inspiration claims to a depth of from 100 to 300 ft.

Uranium Enterprises, a Spokane prospecting company, has been engaged by members of the Spokane Indian tribe to prospect over 30,000 acres on the Reservation, Roland C. Bartlett, president reported. Aerial and ground prospecting will be undertaken. Mr. Bartlett also disclosed that he and associates in Chief Joseph Uranium Corp. will explore and develop a property consisting of 240 acres north of the Reservation, which have been leased from Fay Pentland of Spokane. The latter is to receive a share of the profits.

Gold was the only one of the five basic minerals which had a larger production value in the State in 1954 than in 1953, according to preliminary figures released by the regional office of the Bureau of Mines at Albany. Gold production in 1954 was $2,331,000, compared with $2,189,600 in 1953. Gold output was 66,600 oz which was an increase of 6% over 1953.

Zinc production totaled $4,839,600 in 1954, compared with $7,540,780 in 1953. Zinc output dropped from 32,786 tons in 1953 to 21,800 in 1954. Value of lead was down to $2,730,880 from $2,898,768. Tonnage was down 9% to 10,040 tons. Copper in 1954 was valued at $2,138,400, only $8,000 below the previous year. Tonnage of copper was practically unchanged at 3,600 tons. Production of silver was $284,095, compared with $290,704 in 1953. Silver output was 313,900 oz, down 2% from 1953.

An increase of almost 8% in primary aluminum output in the State was listed in the preliminary annual report from Albany. The output of the five reduction plants was about 430,000 tons valued at approximately $175-million. The 1954 output was over 85 times that of 1940, when ALCOA put the first reduction plant in operation at Vancouver. The chief domestic producer of natural magnesite again was Northwest Magnesite Co. at Chewelah, but its production was down 25% from 1953. Pacific Silica Co. mined the Latshaw silica deposit north of Spokane and at Chewelah the Spokane & Minerals Products Corp. produced silica products.

New 2-compartment shaft extension from a 200-ft shaft dug in 1953 is being sunk at the property of Gladstone Mountain Mining Co. in Stevens County, R. H. Graham of Spokane reported. New shaft will go down about 150 ft when exploration of a known ore chimney will be done by tunneling. The work is being done by A. G. Lotze of Northport, who sank the previous 200-ft shaft in 1953.

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WYOMING

Articles of incorporation have been filed at Cheyenne for the Uranium Ore Reduction Co. of Lander, which proposes to build a refining plant at Riverton.

Frank E. Hays, president, said the company will be capitalized for $200,000 by Utah mining interests. Commitments of milling rights have been obtained from holders of several hundred claims in the Gas Hills area, Hays said.

Directors are Hays; J. Reed Tuft and Allan E. Mecham of Salt Lake City, and Sam Day of Fort Collins, Colo.

Uranium mining contracts and leases in the Gas Hills area of Fremont County have been purchased by British Western America Uranium Corp. of Denver and London.

More than $75,000 in cash and royalties was paid to a syndicate including Juneau Uranium Corp., Niagara Uranium Corp., Mohawk Uranium Corp. and Lander Mining and Uranium Co. Property involved is near the Upetco, Lucky Mc and Green River claims.

McAlester Fuel Co. of McAlester, Okla., has purchased 100 claims in the Gas Hills district from Sam Day of Fort Collins, Colo. Purchase price was not announced.

J. C. Puterebugh is president of McAlester, which has filed 63 other claims in Fremont County.

Wyoming Uranium Corp. stockpiled ore at its Helen May claims in Crooks Gap, Fremont County, preparatory to opening of the new AEC buying station at Riverton.

Stockpiled ore averaged .35% uranium, company officials said. Firm owns 108 claims and two school sections.

Wyoming cattlemen have urged the state legislature to revise mining laws as result of the uranium boom.

The powerful Wyoming Stock Growers Assn. asked that the discovery pit requirement be done away with, contending the pits damage range land and lead to erosion. Core drilling was suggested as a more practical means of validating mining claims.

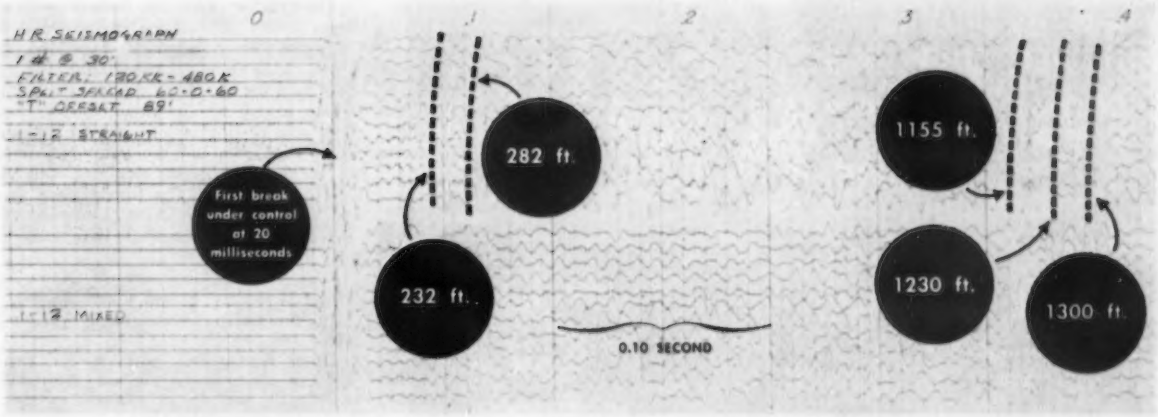
Another bill before the legislature urged stricter controls on aerial prospecting.

New rental rate for uranium leases on state-owned land has been established by the Wyoming Land Board.

Land Commissioner John Riedel said new rate will be 25c per acre per year, the same as oil and gas leases. The old rate was $50 per year per lease up to 1,280 acres.

Riedel said the new rate will be more than six times greater than the old rate on bigger leases. Land Board has kept the uranium leasing rate low in the past to attract exploration, he said, but added that "uranium leasing has now assumed the proportions of oil and gas leasing."

Sapphire Petroleums, Ltd., informed stockholders its uranium discovery in the Baggs area, southwest of Rawlins in Carbon County, has ore ranging from



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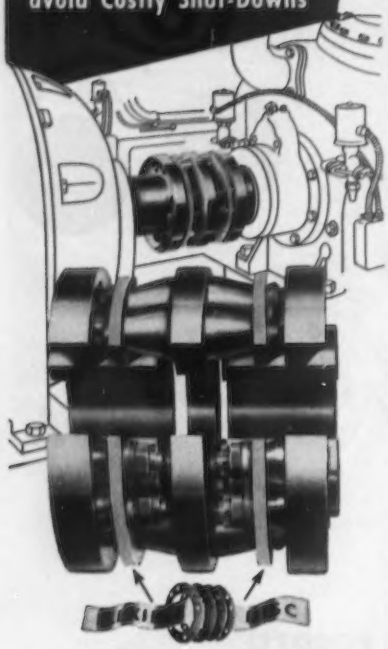

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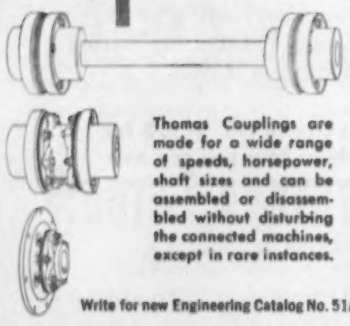

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Wyoming *(Continued)*

1% to 2.48% in uranium oxide.

The report said the exposed portion of the orebody is more than 200 ft long, and from 8 to 12 ft wide on the surface. The company has a 50% interest in 200 claims in the area, just north of the Colorado line.

Public lands in the Pumpkin Buttes area of Johnson and Campbell Counties which were withdrawn by the AEC in 1952 will be re-opened to claim location at 10 am, May 3.

Revocation of the withdrawal, affecting 65,343 acres of both public and non-public land, was asked by the AEC in accordance with its policy of releasing lands in which no substantial uranium deposits were found.

The AEC warned that some of the land involved includes homesteads, school lands, etc., and may not be open to location.

American Smelting & Refining Co. has given up its lease on the Jenkins and Hand spread of uranium claims in the Gas Hills District, Fremont County.

An Asarco official at western mining department of the firm said core drilling conducted over the past several months had not uncovered sufficiently high values to warrant full-scale operation by a company such as AS&R.

The properties are 1½ mi from holdings of the Lucky Mc Uranium Corp.

IN CANADA

Record $1,454,000,000 worth of minerals was extracted from Canada's deposits during 1954, according to annual survey of Bureau of Statistics, which estimated that production, tripling in past decade, jumped last year by $118-million over 1953 yield.

Mineral production was one of Canada's economic highlights in 1954, helping offset in part, effects on national economy of prairie crop failures.

Value of Canada's metals production, which includes lead, copper, zinc, and runs from antimony to tungsten, rose by about $54-million to total of $763-million from $709-million in 1953.

With mine strikes settled, Canada's gold production rose by 224,000 fine oz in 1954 to 4,280,000 with value increasing by more than $6-million to $145.8-million.

Copper production jumped to 600-million lb from 506,500,000 with value increasing to $174-million from $151-million.

Nickel rose by 32,700,000 lb to 320-million with value rising by almost $20-million to $180.2-million. Lead production increased by 55-million lb to 442,-500,000 with value rising by almost $9-million to $59-million.

Additional problems will face most of Canada's gold mines in 1955 as a result of the changes made by Ottawa in the basis on which the Emergency Gold Mining Assistance Act will operate.

Designed to save the federal government about $5-million, or more than 30% of the $16-million expended in 1954, the revised act raises from $18.50 to $26.50 the minimum cost-per-oz below which no aid will be given. A few very high cost producers may receive slightly more than they did last year, but most of the mines will be receiving less. A few of these with the lowest costs per oz—such as Kerr-Addison, Consolidated Discovery, and Campbell Red Lake—may receive none at all.

George Mill, manager of Kelowna Mines at Hedley, British Columbia, said: "This practically finishes us. It will cost about $95,000."

Other mining men estimated the subsidy cut would mean a loss of $110,000 to Pioneer and about $50,000 to Bralorne on the basis of 1954 operations.

BRITISH COLUMBIA

Mining Association of British Columbia has announced establishment of a safety and compensation division that will embark on an industry-wide safety program.

All member companies will be assessed to pay for the program which may ultimately cost $60,000 a year.

Program will be under J. B. Biker, who has been loaned to the association by Consolidated Mining and Smelting. An office will be set up in Vancouver and field workers will execute the safety program.

Plans for aggressive development program on property of Beatrice Mining Co., Ltd., at Nelson, have been announced by company officials.

According to mine manager Walter Scorgie, results of work during 1954 on the company's gold-silver-lead-zinc deposit 5 mi southeast of Sunshine Lardeau mine near Camborne, have been sufficently encouraging to justify extensive diamond drilling designed to intersect the Beatrice lode at substantially deeper horizons.

A nickel strike has touched off a staking rush north of North Bend in Fraser River Canyon.

Representative sample sent for assay by Northwest Ventures Ltd. (who have acquired two groups of claims in the area) showed 1.42% copper, 2.24% nickel, 0.15% cobalt, 0.011 oz platinum and 0.023 paladium.

When weather permits the company will start exploration, including magnetometer survey and diamond drilling.

Northwest Ventures holding was discovered and staked last fall by veteran prospector David Pride who attracted wide attention several years ago when he found the Smith-Pride gold property at Le Pas, Manitoba.

J. B. Thurber of Northwest Ventures, who with J. A. Borthwick, examined the claims and obtained an option to purchase, believes this is first serious prospecting in the region.

B. C. and Yukon Chamber of Mines spokesman said assay was of "excellent grade, and if there's any quantity of it, it could be very important."

British Columbia *(Continued)*

British Columbia uranium exploration company, Great Northern Exploration Co., Ltd., has been purchased for $75,000 by several U. S. financiers including Atlas Corp. president Floyd Odlum.

Sale to Federal Uranium Corp. of Salt Lake City has been announced by Joseph I. Kyle, Great Northern's president.

Great Northern Uranium, with authorized capital of 5,000,000 shares of $1 par, has 1,015,000 shares issued. Federal Uranium has acquired all Great Northern shares in consideration of 125,000 shares of the former's new stock, issued recently on basis of one new for 25 old.

Great Northern will be the operating company in Canada for Federal Uranium.

ONTARIO

Shaft has now been completed to the 400 ft level at Beaucage Mines and the station at that level is being cut. Diesel generator, the electric hoist, and the new electrical compressor are now in operation.

The 300-ft drive towards the orebody has been started and it is expected that the company will be able to mine between 4,000 and 6,000 tons of columbium-uranium ore for use in the pilot mill by the end of March.

International Nickel Co. of Canada, Ltd., in an undertaking at the Stobie section of its Frood-Stobie Mine in the Sudbury District of Ontario, drove a shaft from the bottom up, and completed the project some 20 months earlier than otherwise would have been possible and with a saving of many man-hours. Project was undertaken in conjunction with Inco's underground mining expansion program.

The shaft-built-in-reverse is part of a two-shaft hoisting plant that will handle a daily quota of 18,000 tons of nickel-bearing ore. The twin shafts, Nos. 7 and 8, are less than 100 ft apart to provide the needed hoisting capacity and give flexibility of operation.

Driving upwards at the same time from each of five crosscuts driven from No. 7 shaft at 400-ft vertical intervals, a shaft pilot raise was carried through from 2,000 level to surface. The pilot raise was then widened to full size and concreted, working from surface down and drawing off the broken rock at the bottom.

Exploration for uranium in the Blind River area is being undertaken by New Jersey Zinc Exploration Co. (Canada) Ltd., a subsidiary of New Jersey Zinc Co.

Also associated in the exploration activities is the Nueva Exploration Co., a new corporation affiliated with the Texas Co.

Blind River area continues to rate as the busiest exploration camp in Canada. Among the properties now active in surface work or drilling are the following: Conecho Mines, drilling on 40 claims

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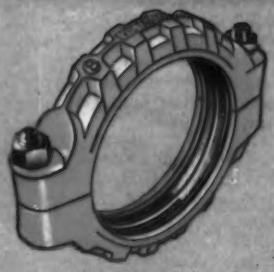

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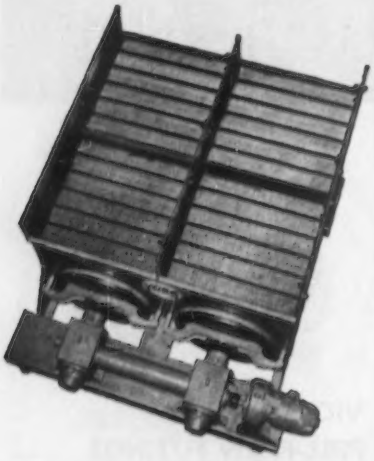

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YUBA jig action is positive. Just set to desired speed and stroke, get constant uniform pulsations that create surface action over full area of jig bed. Result: YUBA M-8 jigs have large material capacity per flow line under full control.

Stroke adjustments between ¼" minimum and 3" maximum are easily and quickly made. Maximum frequency of a 4 cell M-8 jig is 350 at ¼".

YUBA jig design saves space, increases production in new or old dredges or mills. Use to supplement existing jigs or replace other concentration methods. For details of adapting YUBA jigs to your operation, send us data on ore, feed sizes and present installation.

75

YUBA MANUFACTURING CO.
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Ontario *(Continued)*

1¾ mi east of Quirke Lake; Barinouri Uranium Mines, a merger of Barrentier Mines and Antinouri Lake Mining Co., doing geophysical work on 105 claims in the Agnew Lake sector; Stanleigh Uranium Mining Corp., drilling near Lake Nordic;

Huclif Porcupine Mines, drilling on 25 claims in McGivern Twp.; New Thurbois Mines, revived last year to explore 17 claims at Agnew Lake, with three drills now operating; Matinenda Uranium Mines, starting work on a big 151-claim group in Scarfe, Patton, Montgomery, and 161 Twps., 12 mi north of the town of Blind River in the Chiblow Lake sector;

New Mylamaque Explorations Ltd., with 20 claims near Agnew Lake on which drilling was started shortly after the turn of the year; Dominion Uranium Corp., which found little encouragement in work done last year at Rochester Lake, and which has moved its crews over to ground in the Matinenda Lake sector;

Can-Met Explorations, drilling on 12 claims at Quirke Lake; Maralgo Mines and Brunette Porcupine Mines, jointly drilling a 1400-ft hole on the boundary of their Quirke Lake groups; St Mary's Uranium Mines, with contract for 4,000 ft of drilling on its two groups at Lake Nordic and Twp. 155; and Belfast Mines, at work on a uranium-copper showing at Rawhide Lake.

Special mention might be made of Panel Consolidated Uranium Mines, recently formed to acquire 10 properties totaling 419 claims in various sectors of the area. The company has $650,000 for exploration and is starting with a 30,000-ft drilling program.

None of these companies has yet progressed beyond the prospect stage. Main importance in Blind River still lies in the two leaders, Algom Uranium and Pronto Uranium Mines. Algom, with two mines in sight and with 3,000-ton mills planned for each, has just completed financing plans involving $40-million in bonds and equities. Pronto, with a 3,000-ton mill under construction, reports construction well on schedule.

Wright-Hargreaves Mines, veteran gold producer of Kirkland Lake, has acquired a copper discovery not far from the main line of the Canadian Pacific Railway some 20 mi northeast of Port Arthur. A diamond drilling program will be started before spring.

New copper showing is being tested near Elk Lake, not far from Gowganda, by Ex-Mother Lode Mines. Located on a 37-claim group in James and Tudhope Twps., the showing consists of a 700-ft vein, width not reported. A bulk sample from one test pit gave 46.25 tons averaging 14.8% copper and 6.21 oz silver.

Coballoy Mines and Refiners Ltd. has become the Cobalt area's newest operator, having purchased the Colonial mill from Cobalt Consolidated Mining Corp. Eventually it is hoped to secure production from the several old silver-

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WEDGE WIRE MAKES MARCEL-TYPE SCREENS FOR
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SIZING
AND SCREENING
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This screen has a marcel type of construction. Specially designed for rough and abrasive type of materials, gives long life, non-blinding operation and still presents a flat surface for materials to wipe the opening CLEAN. The same dewatering efficiency is prevalent and we might add that this screen was also designed for operations where slivers of materials passing through are objectionable in the end product. Made in all sizes and shapes wherever applicable to higher and productive efficiency.

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Yes, weigh and record with the —MERRICK WEIGHTOMETER

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designated point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service. Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

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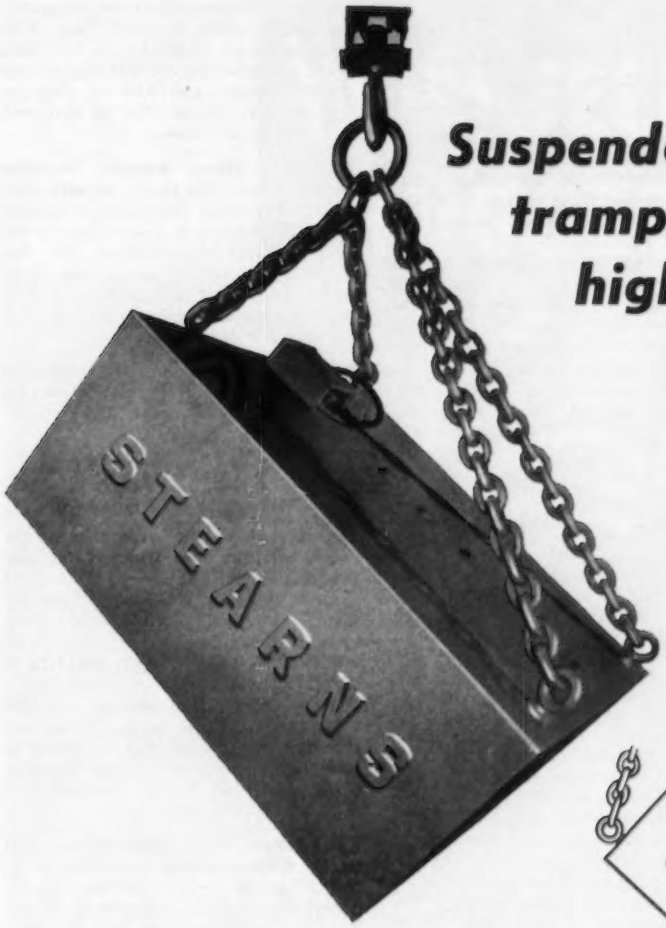

Suspended magnet solves tramp iron problem on high-speed conveyor handling wet or dry material

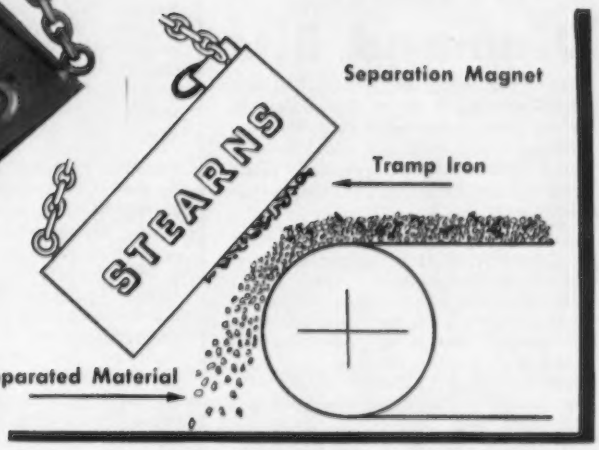

Diagram showing Stearns suspended magnet positioned over head pulley.

Stearns rectangular suspended separation magnet cures tramp iron headaches on fast-moving conveyors, particularly when material is wet.

First, the magnet's length permits its powerful, deep pulling force to work over a large area . . . dig out embedded tramp iron . . . prevent "sneak throughs." Second, the upward movement of iron to the magnet, shakes off wet, clinging material, eliminating costly waste.

Greater Flexibility

Stearns suspended magnet overcomes space limitations because it can be placed over the head pulley, or anywhere along the belt. Sometimes it's set up to remove tramp iron before material moves onto the conveyor — thus safeguarding the belt from damage. In many processing operations, Stearns suspended magnets are used ahead of magnetic pulleys to insure double protection for crushers and other expensive equipment.

Custom-Built

Magnetic specialists at Stearns design and build rectangular or circular suspended magnets, electro or permanent magnetic pulleys in standard sizes, or to your individual specifications. Get complete details from your Stearns representative or write for bulletin 25D.

Check these advantages

- All-welded, moisture-proof construction
- No moving parts that require replacing
- Single coil construction for magnetic field stability
- Leads and terminals fully protected against abrasion
- Vacuum-impregnated windings for long life, dependable operation

1115

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"ORIENTED" Diamond Bits

That's our story in a nut shell and we're proving it every day—not only in our own world-wide contract core drilling operations, but also through the money-saving results being achieved by hundreds of other satisfied users.

After extensive comparative tests had demonstrated to our satisfaction that drill diamonds cut much faster and last much longer when "oriented" in the matrix with their hardest edge or "vector" toward the work, we decided that random setting was both inefficient and wasteful. Since then we have standardized on oriented diamond bits and have produced THOUSANDS — in a wide variety of types and sizes; with both cast- and powdered-metal matrices.

Only selected diamonds of suitable crystaline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to purchasers.

In terms of footage cost, these are the most economical diamond bits ever produced and we invite inquiries on that basis.

Bulletin 320 illustrates and describes all types and gives complete working data. Write for a free copy and tell us about your diamond drilling requirements. Our experienced executives welcome opportunities to make money-saving suggestions without charge or obligation.

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Ontario *(Continued)*

cobalt mines which the company has merged into one group; but initial milling is being done on material contained in the old dumps, estimated to contain 30,000 tons averaging $15 per ton in value.

Hucamp Mines, subsidiary of Conwest Exploration Co. in the Manitouwadge area, is deep drilling to test at 1200 ft the major break which crosses the property. Known to be the same break in which the major orebodies of the adjoining Geco Mines have been found, the structure has been tested at shallower horizons by some 12,000 ft of drilling since the company was formed last year. Drilling showed no ore, but persistent mineralization; management accordingly feels the deeper test is warranted.

QUEBEC

Kayrand Mining and Development Co. has changed its name to Chib-Kayrand Copper Mines, raised new finances, and is starting exploration on its Chibougamau ground adjoining that of Campbell Chibougamau Mines. The property, enlarged by addition of extra ground, consists of 80 claims.

Campbell Chibougamau is moving steadily toward production, scheduled to start during March under its contract with DMPA for sale of 63-million lb of copper. Mill construction (1,750-ton capacity) is just about completed, and the 150-mi power line from Lake St. John will be delivering power within a few weeks. Later this spring a start will be made on shaft deepening, to open a 1,000-ft block of ground below the present bottom level at 1250-ft, a decision made as a result of excellent results secured during recent months in deep drilling from the lower workings of the mine.

Weedon Pyrite and Copper Corp., copper-pyrite producer near Weedon in the Eastern Townships, is expanding its exploration. With production comfortably established on a profitable basis, the company plans to probe below the bottom (90-ft) level, and has also acquired by option a block of ground 6 mi west of the mine where aerial magnetometer work has indicated a strong anomaly.

Barnat Mines, gold producer of the Malartic area, has made its first start in outside exploration. Drilling is in progress on the big group of claims staked last fall in Bressani Twp., southwest of the Chibougamau district. The group is a uranium prospect, a large number of surface showings having been located in preliminary work. First drilling failed to show ore, but gave encouraging indications of uranium mineralization.

Also in Bressani Twp. is Grandines Mines, with a 24-claim group adjoining Barnat on the south; geophysical work will probably be done in the early spring. In the meantime diamond drilling from the ice is in progress at the company's original property in Roy Twp., Chibougamau area. Original work here some years ago indicated 210,000 tons averaging 2% copper and 0.03 oz gold per ton, and it is believed that the new work will enlarge this considerably.

Larandona Mines, formerly Randona Quebec Mines, has signed an agreement with Consolidated Zinc Corp. of Canada for exploration of its seven claims in the Noranda area. Consolidated Zinc has optioned the ground on a basis under which Larandona will receive a 25% interest in a company to be formed if the option is exercised.

Bouscadillac Gold Mines is drilling its columbium-tantalum prospect in the Oka district, 40 mi west of Montreal.

NEW BRUNSWICK

Lateral work is now in progress on the 350-ft level of Brunswick Mining and Smelting Corp. from the shaft put down to test the Anacon-Leadridge orebody, indicated by drilling to contain 27.4-million tons averaging 5.28% zinc, 1.88% lead, 0.58% copper, and 1.79 oz silver.

Two levels will be opened from this shaft, the second to be at 500 ft, and ore from both levels will be tested in 150-ton pilot mill now being installed. The opening will later be superseded by a large production shaft.

New Larder "U" Island Mines has started drilling several anomalies on its No. 50 group immediately east of the American Metal Co.'s property in the Newcastle-Bathurst area. At the company's main property the station for the first level has been cut at 250 ft, and the shaft is being continued downward with 1500 ft as the initial objective.

Newnorth Gold Mines, a sleeper for several years, has come to life with a property north of the American Metal showing, and is diamond drilling to test the most promising of several anomalies indicated in geophysical work.

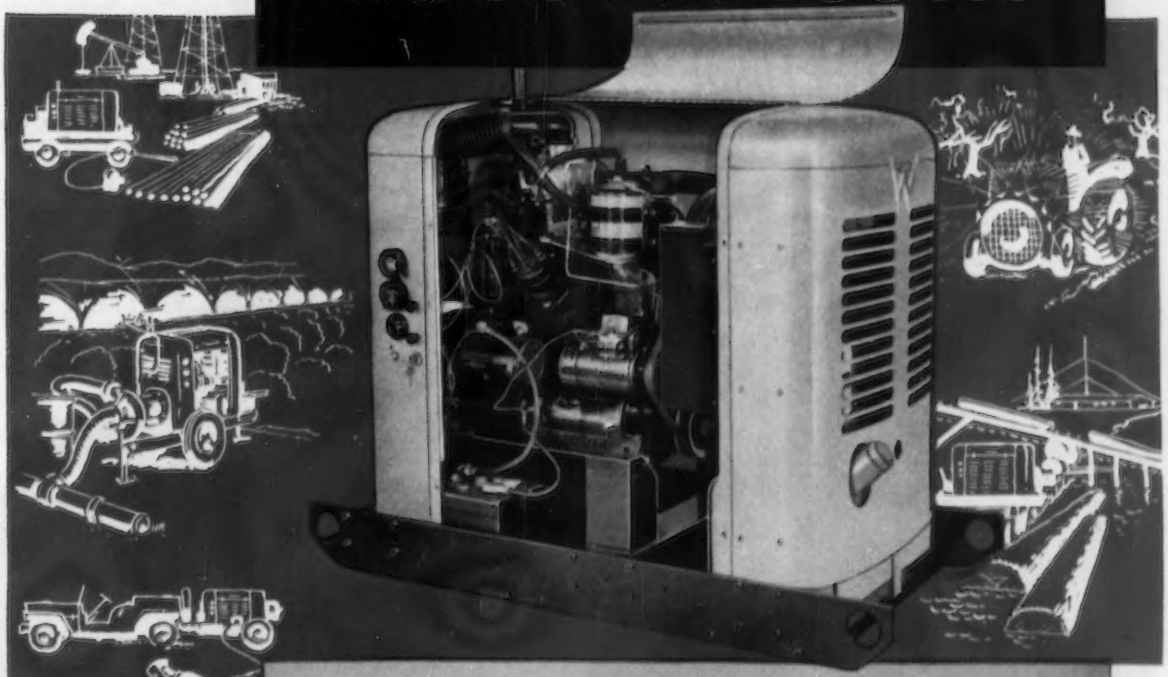
YUKON

General manager of the Yukon's United Keno Hill Mines, Ltd., predicts mining developments of world-wide importance for the Yukon and Northwest Territories provided the Canadian government follows a "progressive policy" in those areas.

Clare E. White, speaking at the annual dinner meeting of the Alberta and Northwest Chamber of Mines in Edmonton, specifically forecast emergence of prosperous mines from such discoveries as:

1. Kluane Lake nickel owned by the Hudson's Bay Exploration Co.; 2. Pelly River lead-zinc showing of Prospectors' Airways; 3. Hyland Plateau property of American Smelting and Refining Co.; 4. Ketza River silver-lead properties still

Here's JEEP ENGINE RUGGEDNESS...



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Model	Jeep	Hurricane	Lightning	Giant Hurricane
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Displacement Cu. In.	134.2	134.2	161.0	161.0
Range Max. bhp	22-60	22-70	28-75	28-90
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Complete Specifications
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It's the new CP-555 Rotauger! Ideal for close-quarter work because of its short overall length, the CP-555 combines two important features in one compact machine. It not only has a fast and powerful rotary drill . . . but it also has an entirely independent rotary motor feed to put the operator in complete control at all times. And talk about speed! The CP-555 can double your footage in softer formations . . . drills 2½ inch holes in speeds of 2 to 4 feet per minute in depths of 100 or more feet. For more detailed information write *Chicago Pneumatic Tool Company, 8 East 44th Street, N. Y. 17, N. Y.*

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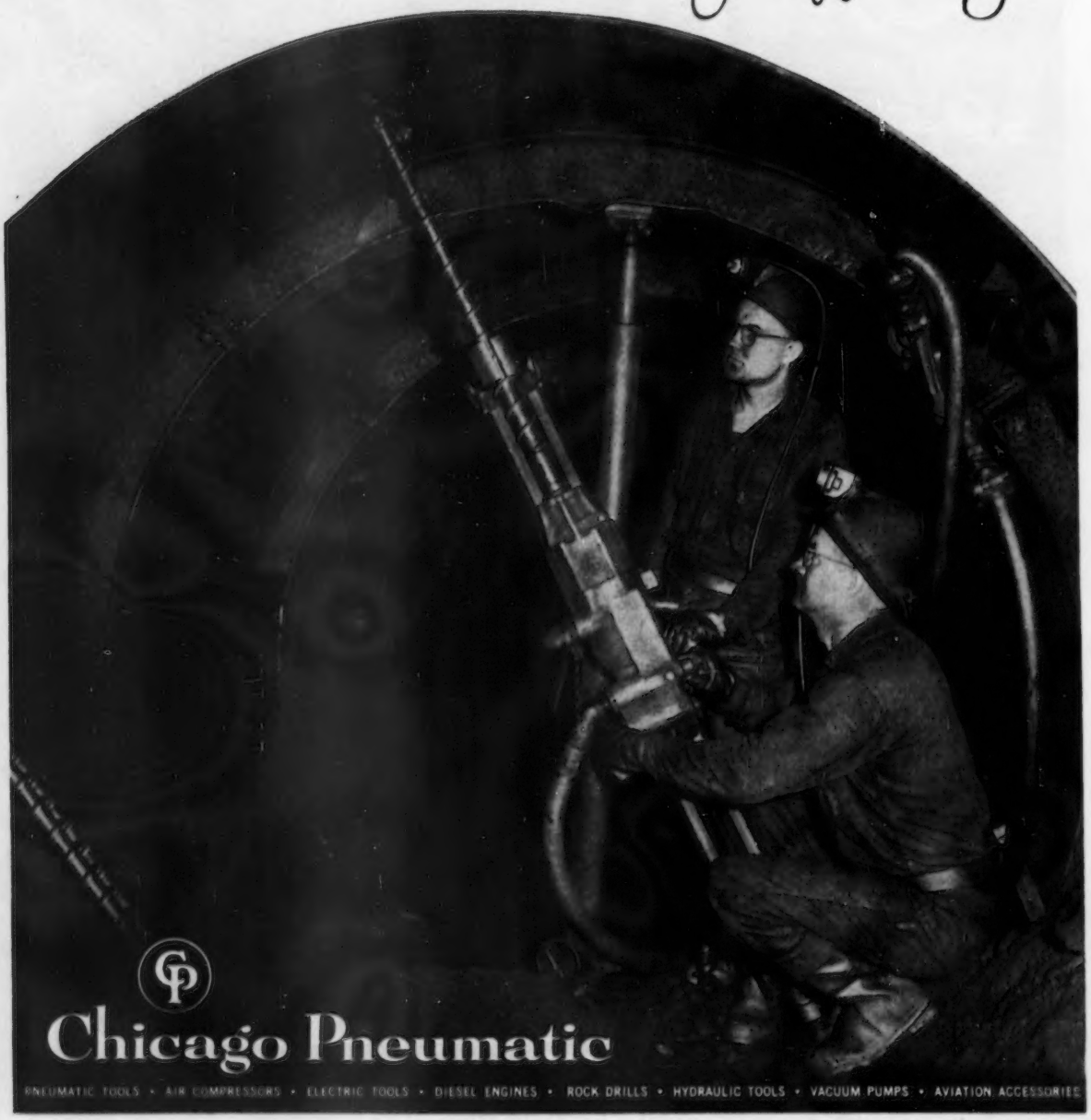
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Yukon *(Continued)*

in the prospect stage; 5. Pine Point lead and zinc of the Consolidated Mining and Smelting Co.; 6. Marion river uranium showings.

NOVA SCOTIA

Rich mineralized zone of high grade zinc with germanium and cadmium values should be reached by an exploratory adit early this year on Cape Breton Island, says Norman Vincent, president, Mineral Exploration Corp. Ltd.

Mineralized zone is located at Meat Cove, and is thought to be part of a larger ore-bearing area with good grades. Orebody was found in the course of a 6,146 mi magnetometer and scintillometer search conducted by Minex for the past two years.

IN LATIN AMERICA

ARGENTINA

Early February saw the birth of Argentina's largest mining cooperative, the Federation of Mining Cooperatives. It embraces 1,268 provincial mining cooperatives and is today the largest single force of its kind.

One of the Federation's principal aims will be to purchase, either locally or abroad, material, machinery and equipment required by the individual cooperative associations. It will also act as distributor of ores and minerals produced by its various associates.

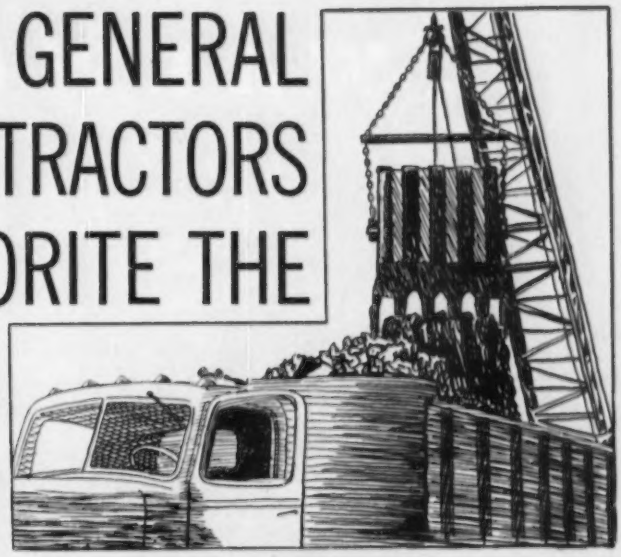
To implement its program, as a first measure, the Federation will undertake a nationwide survey to determine what type of mining machinery and equipment and replacement parts can actually be produced in the country and which must continue to be imported.

By working through cooperatives, the miners will be exempt from an 8% sales tax. Future aim of the Federation, once its financial resources permit, is also to grant credit terms to members. The Federation will be sustained by contributions from its adherents of 0.5% of all their sales.

Argentine authorities are beginning to show a more active interest in the development of the country's uranium resources. Last January a branch office of the National Atomic Energy Board (Comisión Nacional de Energía Atómica) was opened in the city of Mendoza, where exploration of metals with uranium content has advanced most.

To stimulate the exploration of metalliferous sands and precious stones, the Ministry of Industry has dropped an old ruling which obliged prospectors to make a deposit with the government, in

THE GENERAL CONTRACTORS FAVORITE THE RC



Why? Because it has all the features needed by contractors; digging ability and durability in all materials from soft soils to compacted shale. And the proved ability to dig, load and cast economically. Write Dept. E for more information.

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Compare Bemis Waterproof (*laminated-textile*) Ore Bags with the shipping containers you are now using . . . for economy, durability, convenience. Make comparative tests. Send for details and sample bag.

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Send sample Bemis Ore Bag for _____ (TYPE OF ORE) and detailed information.

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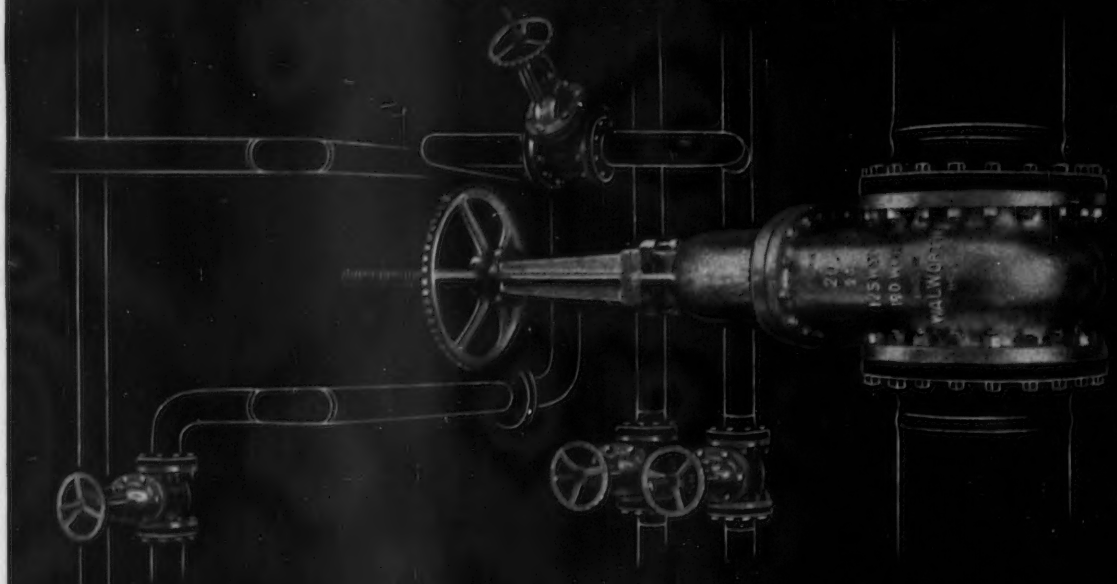
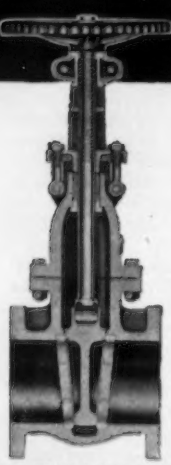
WALWORTH



IRON BODY WEDGE GATE VALVES



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

Better because ...The entire valve, from handwheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.

A wide range of Walworth Iron Body Wedge Gate Valves is available—through your Walworth Distributor—from which you can choose the right type to meet your most exacting conditions. Saddle-type valves as small as ¼-inch; low pressure valves for water and gas pipelines up to 36 inches.

Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Argentina *(Continued)*

the form of a guarantee for prospecting, equivalent to 2% of invested capital.

Long-time U. S. and other foreign companies in Argentina, with capital invested in mining and industrial activities, will now receive the same treatment as that accorded to newly-established foreign enterprises under the foreign investment law, in effect since Aug. 26, 1953.

Previously, old-established companies were excluded from the new privileges, but now they can transfer abroad realized profits up to 8% on the amount of their capital. Alternatively, they are allowed to reinvest their profits, writing them up as additional capital. Both rights must be exercised within the term of one year from the end of the financial year in which the profits were earned.

Benefits of the decree, announced Jan. 18 by the Foreign Investment Committee, covers mining establishments working asbestos, sulphur, silver, copper, tin, iron, manganese, gold and silver deposits; as well as beryllium, mica and wolfram.

BRAZIL

Ores exported through the port of Rio de Janeiro will no longer suffer the additional assessment of 60% over the normal tariffs, under a new order by the Minister of Transport suspending the additional assessment, provisionally.

Brazilian manganese ore production is increasing and is expected to reach the annual rate of more than 1-million tons before the end of 1955, according to the Brazilian Trade Bureau. Chief activity at present centers in the Amapa area, where port and railway facilities are being built. Bethlehem Steel has an interest in the development.

CHILE

Chile's northern provinces of Coquimbo and Atacama are demanding US $516,000 for importation of urgently required mining machinery and equipment, according to a recent survey conducted by Consejo Nacional de Comercio Exterior, the import license bureau.

Ministries of Mines and Finance are studying a new financing plan to be adopted by the Caja de Crédito Minero (Mining Credit Fund), which would enable it to assure stable prices for mineral purchases and maintain normal and increased production of the smaller and medium sized mines.

Underlying problem is that the Caja de Crédito Minero this year is faced with higher wages and much greater overhead expenses, which will amount to an estimated total of 1,000-million Chilean pesos.

Total financial requirements, however, for 1955 will amount to 2,000-million pesos, which coud be met by the sale of gold reserves calculated to reach US $2.5-million this year. Overhead expenses, according to the project under consideration, could also be offset by importation by CACREMI of mining equipment, essential parts, etc., which would be imported at the official dollar rate but sold to users at a profit.

Chilean Ministry of Mines has reported that the Anaconda Copper Co. this year will carry out new explorations for copper in the region of Indio Muerto, 40 km north of Potrerillos.

Company reportedly will invest several million dollars in the work with the object of obtaining new copper sources which will permit increasing production, as it is considered that the Indio Muerto copper ore is as plentiful and as good as that of Potrerillos.

The Ministry also announced the arrival of the head of the U. S. geological mission, George Ericksen, contracted by the geological department of the Corporación de Fomento de la Producción to undertake exploration work of the country's existing minerals.

In recognition of the efficient educational work it is developing in Northern Chile, the Braden Copper Co. made a donation to the Copiapó Mining School, consisting of a complete Ingersoll-Rand compressor.

Two of the small iron mines which are getting ready to export high grade iron ore to the U. S. are beginning to mechanize to reduce costs. Compañía Minera Santa Fé, near Ovalle, has already installed a large Blake crusher and a belt conveyor to carry crushed ore into bins to load the trucks for hauling the ore to Coquimbo port. Compañía Salitrera de Tarapacá and Antofagasta is beginning to receive machinery from the U. S. to start exploitation by April or May. Most difficult problems for the small iron mines are moving the ore to the coast and loading of ships within reasonable time at the poorly equipped northern ports.

Another large drilling program which is going on at present in Chile is that of the Mantos Blancos property east of Antofagasta carried on by Mauricio Hochschild and Co. Mantos Blancos is owned in part by the Instituto de Fomento Minero de Antofagasta and few private owners and is located 25 mi east of the port of Antofagasta.

Chilean Ministry of Mines has announced that the "Africana" mine owned by the Anaconda Copper Co. and located near Santiago will start operations within two months. It would produce 20,000 tons of copper concentrates annually, the announcement added.

COLOMBIA

What may be the biggest base metal mining operation in the country is planned by South American Service and Development Corp., Washington, D.C. Mining concession, taken out by Dr. Gilberto Moreno-Restrepo, covers a 66,717-acre area centering around the village of San

NEW

VULCAN-DENVER

EXTRA HEAVY DUTY

50 h.p. SLUSHER HOIST

New Vulcan-Denver double drum single shaft 50 h.p. slusher hoist... 1 of 13 operating in this western mine. Selection of Vulcan hoists was based on this company's successful experience with Vulcan's 150 h.p. slushers during the past 20 years.

The rugged design of these units features extra heavy gears, shafts, bearings and a special all-steel high-rated motor...to assure dependable operation.

HOISTS: 10 TO 1,500 H.P.

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Forge it uniformly . . . finish it to extremely close tolerances . . . and deliver it fast—they were the requirements on this large alloy steel drum shaft for a mine overseas. In record time Midvale poured the ingot, shaped the shaft in its huge presses and had it finished to an overall length of 40 feet 6 inches, diameter of 38 inches with a bore of 7 inches.

This type of service has been routine to the men of Midvale for more than a half a century. They have made a specialty of supplying the mining industry with large forgings and castings of all types. Midvale quality is carefully guarded from the time the ingot is poured until the finished piece is loaded for shipment. Tests and supervised inspections are made in every step of production. Final tests—X-ray, sonic and others as specified—assure sound forgings and stainless steel castings for outstanding performance in the most severe service.

Next time you need shafts, rolls, roll shells, gear rings or high alloy castings get in touch with Midvale. You can be certain of satisfactory service and products.

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MIDVALE

FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

Columbia *(Continued)*

Joaquin, Cauca department.

Deposit reportedly consists of lead, copper, tin and zinc of high grade. It is easily accessible to the Pacific coast ports of Buenaventura and Tumaco, Dr. Moreno-Restropo says. He foresees the supply of most of Colombia's metal needs from the property.

PERU

Existence of uranium oxide ore with 2.46% content has been verified in the Colquijirca mines, near Cerro de Pasco by Junta de Control de Sustancias Radioactivas, government group which has been working with the U. S. Atomic Energy Commission.

Colquijirca mines, owned by Fernandini interests, have yet to be delineated.

Vilcamba region, southern Peru, has already been confirmed as a source of 1.8% U_3O_8 ore, increasing national hopes for a rich uranium industry.

As a result of the normal stabilization of operations and because of the current limited U. S. market for iron ore, Marcona Mining Co. has reduced shipments from the southern Port of San Juan during the past six months.

Shipping at present amounts to around 120,000 long tons monthly. Peak month since the start of shipping operations April 30, 1953, was over 200,000 tons. Since that date the company has shipped a total in excess of 2.8-million tons as of the end of 1954.

Peruvian government royalty on this tonnage is 6% up to 1-million tons and 7% over that amount. This percentage is computed on the price of the U. S. Old Range-Bessemer iron ore which, to date, has been $10.30 per ton.

Charles E. McGraw has been named general manager and vice president of Marcona Mining Co., succeeding Harlan A. Walker, who has returned to the U. S.

Eugene Mills, formerly asst. mine manager and chief engineer, has been named manager and chief engineer, at the port of San Juan and the Marcona mines.

Mr. McGraw was with the first group to arrive at San Juan in the early part of 1953.

MEXICO

Mexican Sulphur Co., S.A., subsidiary of Mexican Gulf Sulphur Co., on Feb. 11 made its first export shipment of sulphur from its Frasch process operation at San Cristobal, Veracruz. First shipment, loaded at Mexsul docks at Coatzacoalcos, was destined for Pennsalt International Corp. in Philadelphia to be used in Pennsalt's I. P. Thomas plant at Paulsboro, N. J.

A trial shipment (150 tons), the sulphur was packed in multiple-ply paper bags, manufactured in Mexico.

Commission de Fomento de Minera early in February completed dewatering of the Nueva Luz shaft at Nueva

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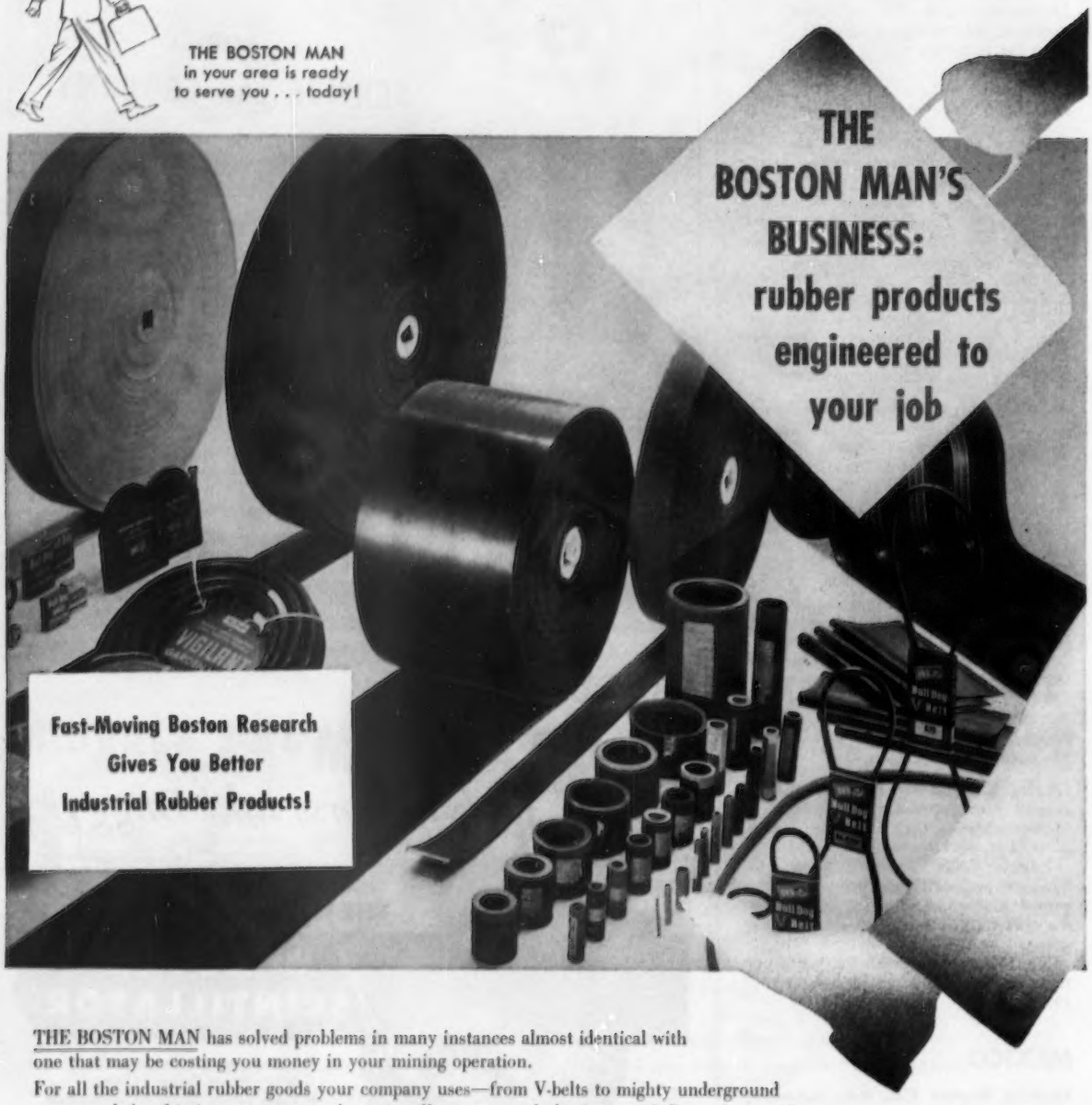

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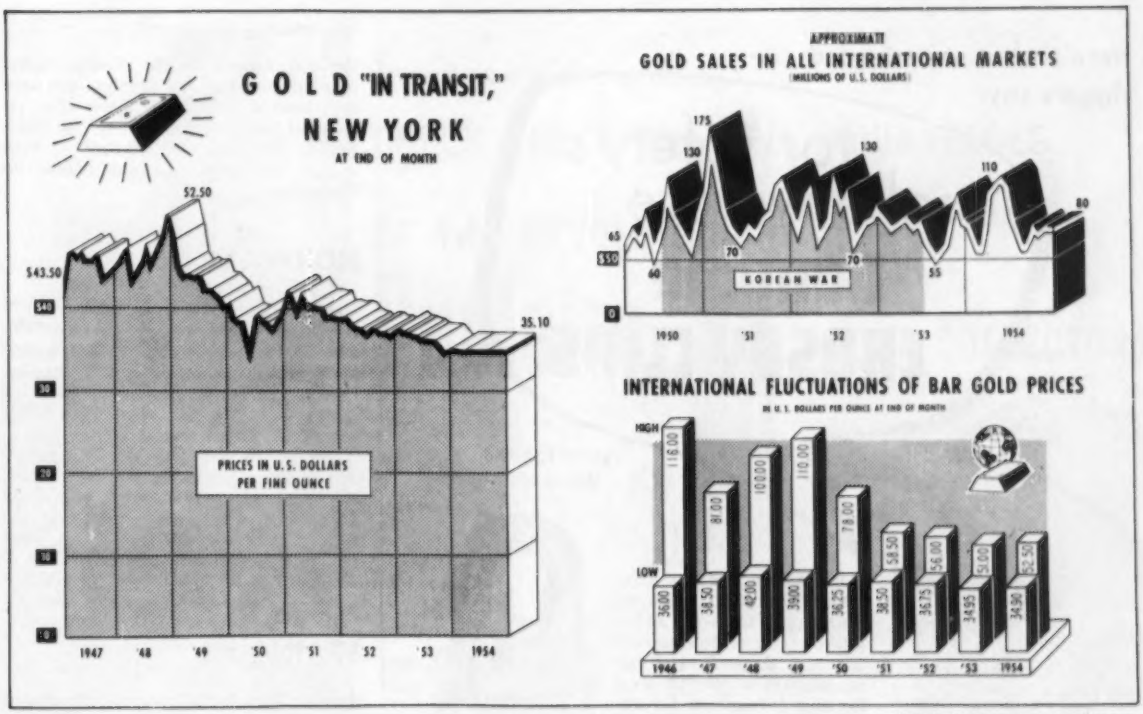

(Picks' World Currency Reports)

Mexico *(Continued)*

Luz mine, Guanajuato. Water nearly topped the collar of the 600-m shaft, which is the deepest in that area. Nueva Luz property has been mining the Veta Madre vein, which has been worked since 1550 primarily for gold and silver.

Nueva Luz shaft, sunk in about 1906, intersected copper ore which runs about 3%. Ore is chalcopyrite and contains small values in lead, gold and silver.

Decision to dewater the mine was based on the current high price of copper and for the general welfare of the region.

Gold and silver is still being mined from the upper workings of Nueva Luz. Ore is concentrated at the property in a 12,000 ton per month flotation mill. Concentrate is then shipped by rail to Torreon, in the state of Coahuila, where it is refined by Compañia Metalurgica Peñoles, affiliate of American Metals Co. The gold and silver operation is being run by the Cooperative Santa Fe de Guanajuato.

Reports reached Mexico City early in February of development of the first extensive lead deposit in Chiapas in southeastern Mexico.

Mining reportedly has begun on a small scale on a 5,000 acre property near Chico Muselo, 25 mi from the Guatemalan border. Production reportedly is expected to reach an eventual 100 tons a day of high-grade ore.

Chico Muselo deposit was said to have been discovered in 1947 by a Mexican prospector. Test drilling was reportedly undertaken a year ago.

Galena is mixed with a small amount of silver. It will be trucked some 150 mi to Arriega to the Pan American Highway and from there shipped to Torreon, Coahuila for refining.

The property is located at 2600 ft. Base camp, including a hospital, commissary and an air strip reportedly is being set up near the San Nicolas Railroad.

Mexican Gulf Sulphur Co. in mid-February reported completion of major ore docks and other facilities at Coatzacoalcos (see E&MJ, January 1954, p 72).

Paul Nachtman, president, announced that the company has also completed important additions to the San Cristobal plant, increasing by approximately 30% the amount of super-heated water available for the Frasch process operation.

VENEZUELA

During 1954 more than 5-million tons of Venezuelan iron ore were shipped to the United States, an increase of approximately 3-million tons over 1953, main factor in the increase was Orinoco Mining Co.'s production in the vast Cerro Bolívar deposits.

Orinoco Mining Co., Venezuelan subsidiary of United States Steel Corp., which last year shipped a trial order of 10,000 tons of high grade iron ore from its Cerro Bolívar mines to England, has received what it describes as its first order from the UK. Francis Thomas, Orinoco president, said a British firm has ordered immediate shipment of 100,000 tons of the high grade ore. He added that during January Orinoco expects to ship 400,000 tons to the U. S. from its Puerto Ordaz docks in 43 vessels.

IN EUROPE

ENGLAND

A "conservative estimate" that 450,000 tons of new copper would be forthcoming on world markets in the period from 1953 to 1958 was given by R. L. Prain, Chairman of the Rhodesian Selection Trust at an informal meeting of shareholders in London last month.

Of this total, he said 264,000 tons would be produced in the U. S., 81,000 in Canada, 61,000 in Africa and 45,000 in Yugoslavia.

This was not the whole picture, however, for it had just been announced that four big American mining companies would develop the first of Peru's three big mines to be operated. (See *E&MJ*, February 1955.)

"They haven't said when or at what rate, but I have reason to think that there will be 100,000 tons of ore coming into production over the next five years," he added. "This brings the new copper prospects to over 550,000 tons."

A wide scale survey covering 35,000 sq mi of Rhodesia was being conducted by his company—and so far they had found about 12 sectors which would merit drilling operations, Prain said.

GERMANY

Uranium has been found recently in the German state of South Baden. Besides

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Germany *(Continued)*

the old deposit in the Kinzig valley, uranium minerals and uranium ore have now been discovered in three other regions of the Southern part of the Black Forest. The new deposits are of high enough quality to encourage further investigation.

NORWAY

Norway's production of aluminum will rise from 60,000 tons in 1954 to 100,000 in 1955, according to a year-end prediction by Johan Muerer, Managing-Director of Norsk Aluminum Co. This marks a steady rise since 1946 when output was 16,700 tons.

The 40,000-ton increase is expected due to expansions at the Aardal & Sunndal Werk, where 1954 output was about 26,00 tons. Plans made public at the end of 1954 indicate that within some six years the annual output at Aardal & Sunndal will be 85,000 tons.

SPAIN

Spanish Minister of Industry Sr. Planell Riera, has disclosed in a comprehensive survey that almost all branches of Spanish industry recorded increases in 1954.

Among nonferrous metals there was a notable increase in aluminum output, despite electricity restrictions. A further sharp rise will take place in 1955 when the Valladollid works of the INI-owned Empresa Nacional del Aluminio turns out 7,500 tons, to be increased to 10,000 later. In addition, production was being increased at the Sabinanigo works and a new alumina factory was being built to treat Spanish bauxite. Other nonferrous metal output was as follows (in metric tons, showing percentage change compared with 1953):

Wolfram ore	3,100 (+7%)
Lead metal	57,500 (+17%)
Zinc metal	23,400 (+2%)
Tin metal	810 (+12.5%)
Aluminium metal	5,600 (+36.5%)
Copper metal	7,200 (−2.5%)

SWEDEN

A sinter plant for producing iron oxide from pyrite ashes, the first of its kind in the world to be installed in the cellulose industry, recently began operation at the Mo and Domsjö sulphite mill at Alfredshem, in northern Sweden. By means of the sinter process, the waste ash, a by-product, previously considered of little worth, is now converted into a coke-like substance which is easy to transport and can be used in the production of iron without further processing. It merely has to be heated to a temperature of about 2400 deg. F, when the sulphur contents of the ash are reduced to 0.05%. The sinter method has been developed by the Boliden Mining Co., an important supplier of pyrites.

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As the ring moves up and down the tube, the fabric is flexed and blown at the same time, thus loosening the *dust in small portions*. The blow ring travels up and down the filter tube until the filter is clean, then automatically stops until the tube again requires cleaning.

Cleaning action is uniform and steady. There are no sudden pressure surges as filter surface is cleaned — no destructive rapping or jarring operations to shorten life of filter element — no wide variations in gas flow or plant efficiency!

If you use bag-houses or other similar collecting systems in your plant operations, be sure to investigate the *many* vital advantages built into Western Precipitation's new DUALAIRE Dust Collectors. Backed by the same well-known organization that pioneered commercial application of COTTRELL Electrical Precipitators and MULTICLONE Mechanical Collectors, DUALAIRES bring entirely new performance and efficiency standards to filter-type collection systems.

As outlined at the left, heart of the DUALAIRE is a reverse-jet blow ring that travels up and down the cloth filter tube, keeping it clean without the alternate choking and pressure surges characteristic of conventional rapping, vibrating, or jarring systems of cleaning off the collected dust. *Result—*

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▶ **LONGER FILTER LIFE** is obtained because the filter fabric is not subjected to destructive jarring, rapping and vibration of conventional filter cleaning methods. The Dualaire cleaning action is gentle — yet far more effective!

▶ **LESS EQUIPMENT IS REQUIRED** to handle a given capacity with the Dualaire because no standby sections need be provided for gas cleaning while other sections are shut off for rapping. The Dualaire filter is kept constantly clean — automatically — while it is filtering out the suspensions. The gas is filtered and the dust removed simultaneously — without interruption. Saves space, simplifies installation!

▶ **MAXIMUM ADAPTABILITY** to varying installation requirements is assured by the "sectionalized" design of the Dualaire. Each section is available in 5 different heights — and as many sections can be bolted together as desired to meet plant requirements. As needs increase, simply add more sections!

▶ **EFFICIENT STRAIGHT-THRU DESIGN** of filter tubes assures easier dust recovery, better flow. Dirty gas enters top of tube, is filtered through the walls, and dust drops by gravity through bottom of tube into collection chamber. Separated material does not re-entrain in the gas flow.

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IN AUSTRALIA

Large quantities of tin may be added to Australia's workable resources if experiments with a new Netherlands machine are successful. Senator Spooner, National Development Minister, said his department had introduced the machine to sample alluvial mineral deposits. In its first test on a tin dredging project in Tasmania, the machine had discovered reserves of tin sufficient to extend the working life of the project by at least five years, he stated.

The machine is a mechanized pit-digger. It sinks a pit 16 in. in diameter to 80 ft and the material removed is washed in a portable treatment unit.

Australian mine output of gold in the 10 months to October 1954 was 923,589 fine oz which is 5.4% more than in the corresponding period of 1953.

There is little doubt that the total 1954 figures, when available, will show an increase over the 1,075,450 fine oz for 1953. This is despite the fact that the Gold Producers' Association has suspended its operations and that several mines and dredges, principally in the State of Victoria, were closed. Two of five principal Victorian mines have been recently closed and only two of the main dredges are still operating. Victorian annual production loss will amount to some 20,000 oz. Big Bell Mine in Western Australia (also closed down) was an important producer of gold.

Government subsidy plan for gold industry is now in operation. To be eligible for a subsidy the mine must show that at least 50% of its total output is composed of gold. Large gold producers (over 500 oz a year) will receive three-fourths of the amount by which the average cost of production per oz exceeds £A13-10-0. The maximum payment, however, is restricted to £A2 an oz. Small producers would be eligible for payment of subsidy at a flat rate of £A1-10-0 an oz. The subsidy scheme is expected to lead to an increase in output of several marginal mines.

No. 2 drill at the Mary Kathleen uranium lease intersected 180 ft of pitchblende ore and is still in the ore at 500 ft. Chairman of the A. O. E. Ltd. which is exploring the lease, said that major intersection of the lode material in the No. 1 diamond drill hole totaled a combined width of 240 ft of pitchblende ore assaying 0.33% uranium oxide over the first 150 ft. Further assays are being made.

Red Terror Gold Mines N.L. reports assay returns from sampling on the Rich John lease at Mt. Isa. These show equivalent uranium value to 1.63% uranium oxide. The assay return on the Cora Lee lease was 0.4% uranium oxide.

Mt. Isa Mines Ltd., controlled by American Smelting & Refining Co., has secured options over four uranium leases covering more than 650 acres in the Mt. Isa area. The leases are located about 24 mi south of Duchess. Surface sampling of the leases was commenced and diamond or churn drilling may start in the near future. Mt. Isa Mines Ltd. has also applied for mineral leases covering about 640 acres on the outskirts of Mt. Isa proper.

Rich uranium assays have been reported from the El Sharana lode in Northern Territory by United Uranium N.L., Northern Uranium Development and Uranium Mines N.L. Some samples assayed up to 9% uranium oxide but work had to be suspended because of the wet season and the high susceptibility of rich ore to leaching by rain.

Eagle Picher Co. of Cincinnati, Ohio, is sending a team of experts to New Zealand to investigate mineral values near Te Aroha. Auckland Smelting Co. which worked the fields for some time was led to believe that substantial lead deposits are located near Te Aroha and the U. S. firm will investigate the deposits.

Hill 50 Mine at Mt. Magnet again broke its record when 8,740 short tons of ore were treated in four weeks to provide 6,136 fine oz gold against previous record of 8,722 tons for 6,129 fine oz. Its neighbor, Hill 50 Consolidated Mine is also showing very promising assays.

Golden Plateau's last assays in Queensland averaged over 1 oz gold to the ton. Some boreholes on No. 4 level have given intermittent good values.

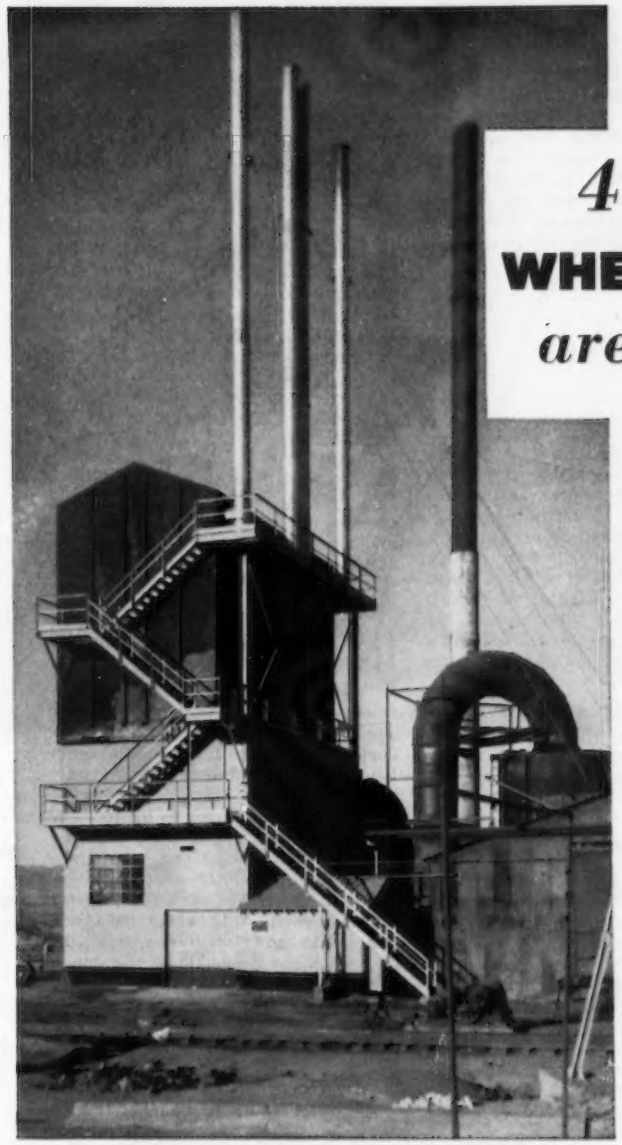
IN THE NEAR EAST

TURKEY

It is reported that following further successful drillings, Etibank has now decided to exploit wolfram deposits which have been found on Mount Uludag, near Bursa. According to a reported declaration of Prof. Nafiz Pamir, Director-General of the Mineral Research Institute (M.T.A.) these deposits are very considerable and the ore is likely to produce a yield of 5% to 10%. It appears that the most promising soundings have been made near the summit of the mountain.

IN THE PHILIPPINES

Bureau of Mines reports the discovery of large deposits of lateritic material containing 1%-1.8% nickel and from 40%-46% iron on Nonoc Island near Surigao in northern Mindanao. As of Dec. 15, 1954, a total of 460 test pits had been completed and 40 others had been started. The 500 pits represent an aggre-



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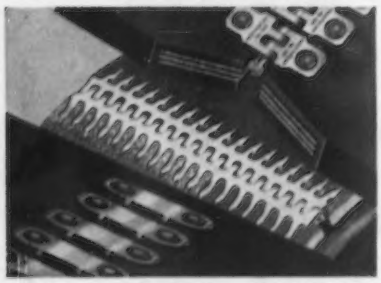

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Philippines *(Continued)*

gate depth of 4,000 meters. A total of 3,710 samples had been submitted to the Bureau of Mines for determination of iron and nickel content. Reserves are estimated at 16-million tons of which 6-million tons are estimated to contain 1.8% nickel. Wilford S. Wright, technical advisor of the FOA and Arsenio Salazar of the Philippine Bureau of Mines are directing the work.

IN ASIA

INDIA

Government of India's drive to discover new minerals, through the widely-publicized offer of cash awards, has resulted in the unearthing of a new deposit of beryl ore in Andhra State (southeast India). A research student of the Andhra University is the discoverer. An officer of the raw materials division of the Department of Atomic Energy has certified the new ore as being capable of producing a tonnage to meet the stipulation laid down by the government.

India's first $2-million nuclear reactor will be ready by 1957, according to the head of the chemistry division of the Indian Atomic Energy Commission.

Reactor will be constructed at Trombay, near Bombay city. It will use natural uranium and monazite sand, now being processed at Alwaye, South India, to produce a "few megawatts."

According to the official, the reactor is expected to serve several useful purposes: It will provide training facilities; a source of high neutron flux; and greater scope for the study of crystalline and the structural aspects of solids.

The Trombay project has been under construction for a year. It is situated on an island near two new refineries, from which it expects to utilize waste gases.

JAPAN

Mitsubishi Metal Mining Co. and Mitsubishi Shoji Co. are scheduled to conclude a contract soon with Thai interests for establishment of a joint Japanese-Thai firm to develop Cheang Phra tin mines in Nazan, Thailand, near Malayan border. Plans call for capitalization of $228,000 with Japanese investing 49% and the Thais 51%. The mines are expected to produce monthly 48 tons of tin ore which will be sent to Mitsubishi Metal Mining's Ikuno refinery for refining. Tin content of the ore is reported to be 500 grams per cu m.

Okura Trading Co., Tokyo, has negotiated a deal to import 6,500 tons of manganese ore from the USSR in exchange for 500 tons of wire rod. The settlement basis for the ore was $30 per long ton, c.i.f. Japan, a spokesman for the company said.

Negotiations for additional tonnages of manganese ore from Russian sources for Japan are reportedly going on.

RUSSIA

Russia's mining industry has claimed substantial gains in production during 1954.

A report issued by the USSR Council of Ministers' Central Statistical Administration announced that output of coal, peat, iron, manganese, slate and asbestos exceeded government-set goals last year. It listed these specific increases for 1954 as compared with 1953: lead 13%, zinc 7%, and coal 8%. No mention was made of percentage increases in iron or copper ore production, but output of pig iron increased 9% and refined copper 5%..

In 1953 the Soviet Union claimed a 22% gain in lead production, 13% in zinc, 6 % in coal and 9% in pig iron as compared with 1952. Copper production increases, if any, for 1953 were not disclosed.

IN AFRICA

Over $5-million are to be spent on construction works for the exploitation of copper and cobalt deposits at the Kilembe mine in western Uganda, largely by South African firms. Works include a concentrating plant, a hydroelectric station, roasting plant and copper smelter.

Job will take about two years and it is planned to have the mine in production towards the end of 1956. Contracts for civil engineering works have been awarded to the Owen Falls Construction Co., which is composed of a group of British, Dutch and Danish firms. This company built the Owen Falls Dam.

A deposit of hurlbutite has been found in the South Urungwe area in Southern Rhodesia. The only other known occurrence is in the U. S. No details are available of the extent of the deposit.

Uranium plant at Luipaards Vlei G. M. some 20 mi west of Johannesburg was officially started up during January. In February, a further plant on the Far East Rand Vogelstruisbult was to be commissioned and the first two in the Orange Free State gold fields will commence operations shortly.

Apart from the erection of the plant, uranium extraction at Luipaards Vlei has involved large-scale mining operations. New ore and waste passes had to be cut in the Turk shaft section of that mine, equal to a distance of over a mile. New stations and loading bins were cut and two shaft compartments equipped for hoisting — all without interrupting operating in the shaft on which the company mainly depends for its gold ore.

Largest sulphuric acid plant in Southern Africa and one of the biggest in the Southern Hemisphere has come into production at the Virginia Gold Mine in the Free State. It will supply the bulk of the

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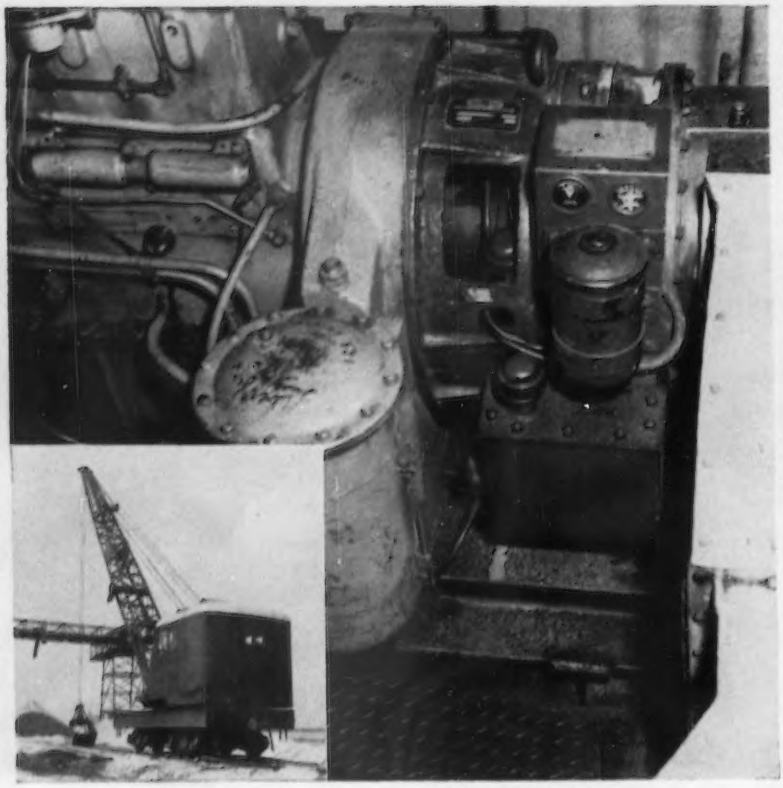

Model F Torque Converter behind Cummins HBI-600 powering "Green Hornet" at Missouri, Illinois Material Co., one of leading aggregates producers in St. Louis area. Twin Disc Torque Converters are provided in 3 types, with capacities up to 650 hp.

Diesel power with torque converter cuts fuel costs 50% on "Green Hornet"

With an old locomotive crane affectionately dubbed the "Green Hornet", Missouri, Illinois Material Co. of St. Louis is realizing drastic savings, outstanding performance . . . from a Cummins Diesel conversion unit working through a Twin Disc Torque Converter.

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Africa *(Continued)*

acid needed for the "U" Plants in the area and will have a capacity of 330 tons of acid when in full production.

Acid is made from pyrite which occurs together with gold and uranium in the Basal reef. After these two metals have been extracted, the residue is put through a flotation plant and the pyrite extracted. After concentration this is burnt to provide sulphur dioxide which, after careful purification and drying, is converted into sulphur trioxide by means of a vanadium catalyst. The gas is then absorbed as sulphuric acid.

New conveyor belt is being built to carry ore from Doornfontein G.M. No. 1 shaft to the reduction plant over a distance of a mile. It is of a new rope driven type. The carrying belt of single ply 32 oz cotton duck fabric runs between two steel ropes. Belt has moulded into its construction spring-steel straps at approximately 2 ft 6 in. intervals extending across the belt and projecting on either side with carrying shoes. These have rubber inserts and the shoe sits on the steel cable supporting the belt between the cable. Weight of ore causes the belt to assume a trough shape and under working conditions the grip of the shoes prevents any slip. Ropes are driven by two Koepe driving pulleys coupled by differential gearing.

Bancroft Mines, the developing copper mine in Northern Rhodesia, will have an output of 85,600 tons a year by 1960—double the original capacity. The cost will be some $14-million in addition to the original capital expenditure estimated at $34-million. This higher output will cut costs of production.

New funds will be provided by loans from the Anglo-American Corp. and the British South Africa Co. Ore reserves at the middle of last year were estimated at 92-million short tons of 3.67% copper.

Reznde Mines at Umtali in Southern Rhodesia has been closed down. It was one of the oldest and largest mines in the territory. Since it started production in 1889 it produced nearly $21-million worth of gold and paid out $3-million in dividends.

Expansion of the big uranium plant at Randfontein is practically completed, it is stated in the company's December quarterly report published with those of the other South African mines in the Johannesburg Consolidated group.

Kansanshi Copper Mines, near the Belgian Congo Border, the first copper deposit found in Northern Rhodesia, is to be reopened. A sum of £1-million is to be spent on establishing a pilot plant which will produce 12,000 tons of copper ore a month from the mine, which is also reported to contain gold and radioactive materials.

A report by the consulting engineers recommended that the copper should be electrolytically refined in order to recover the gold content. The radioactive content of the ore was not expected to be of economic importance.

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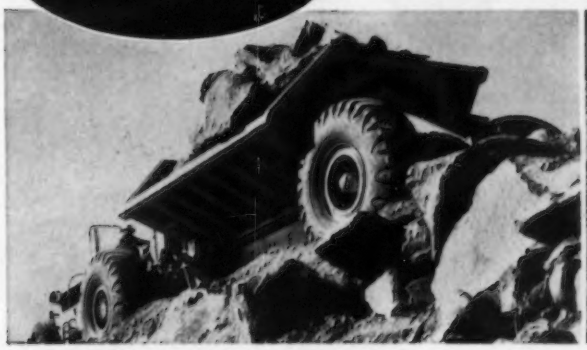

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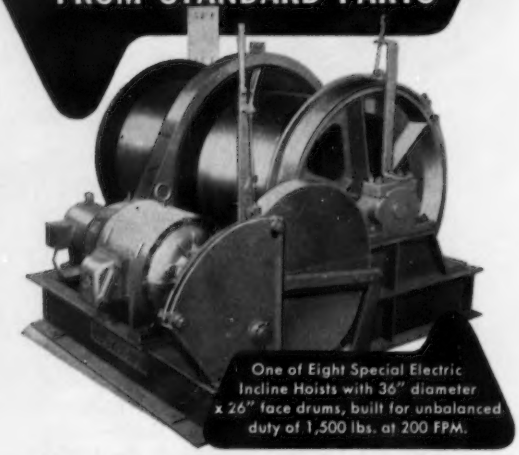

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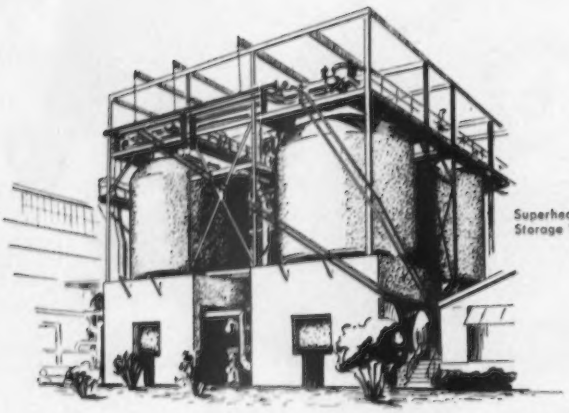

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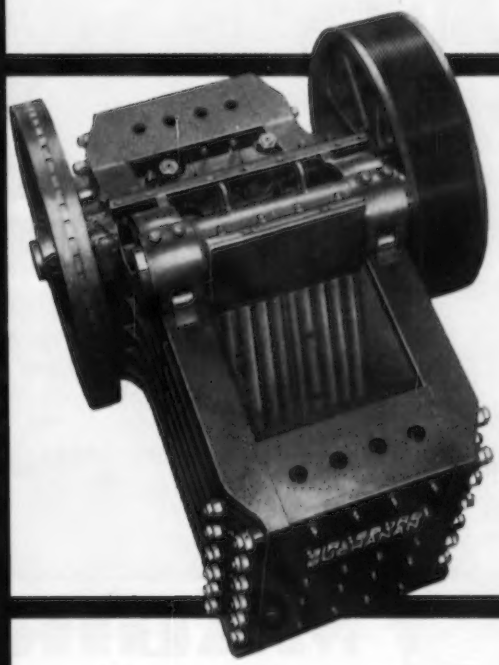

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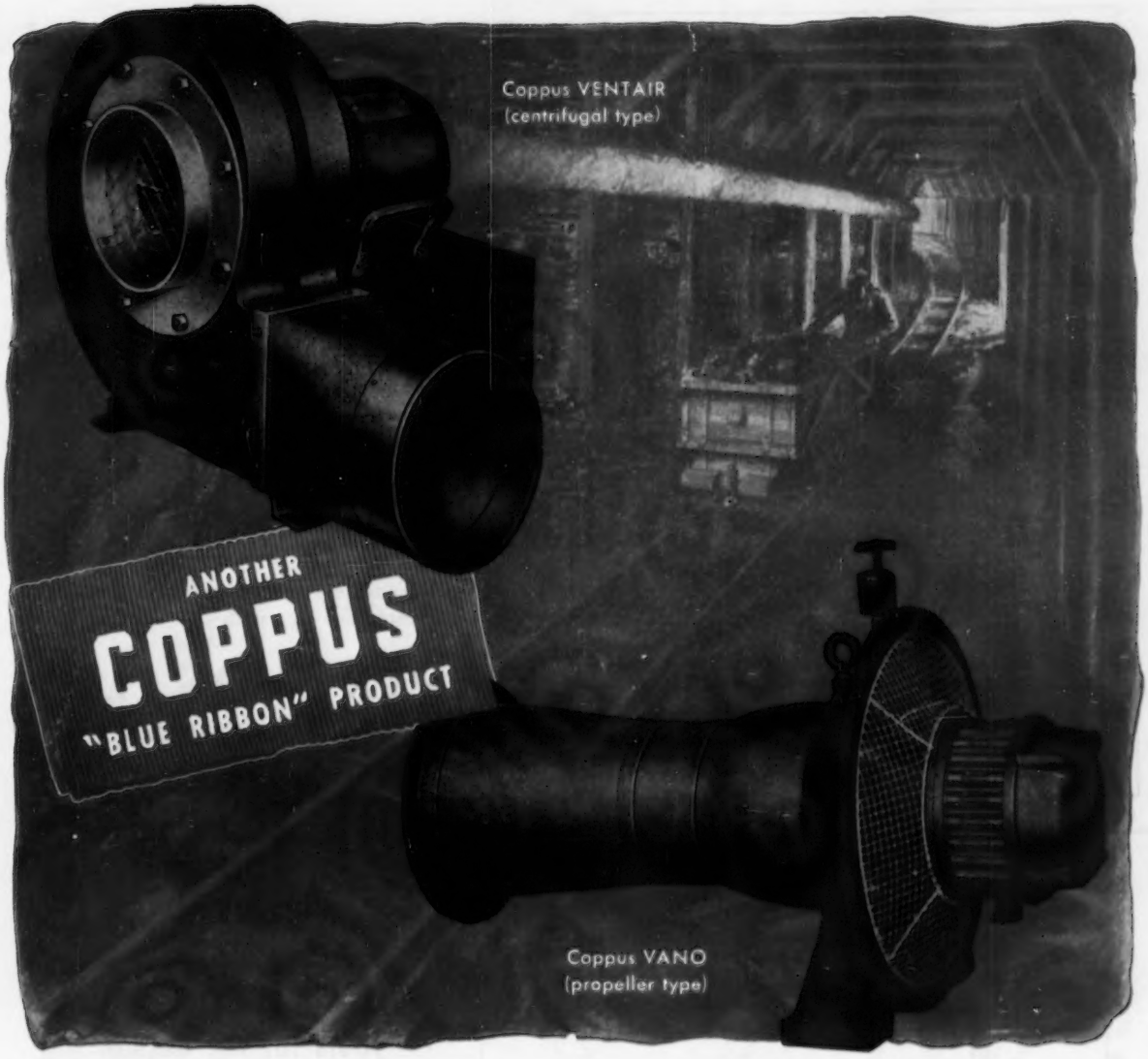

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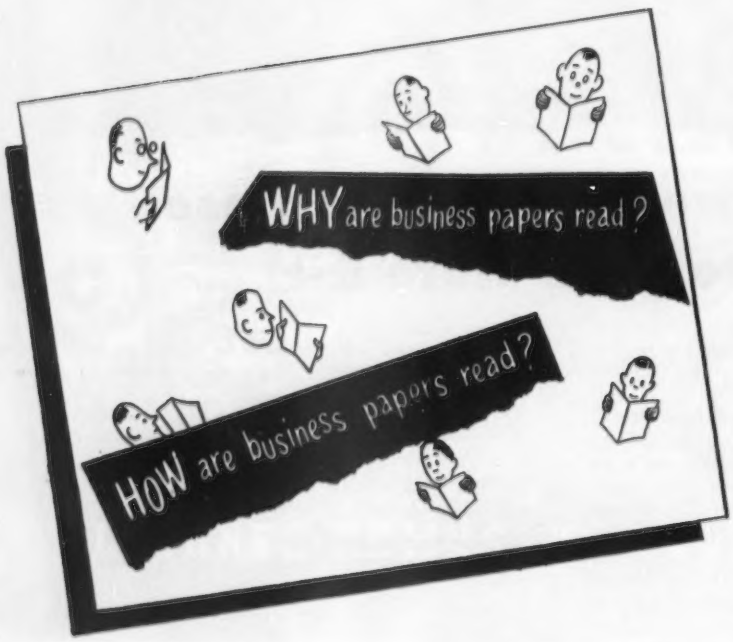

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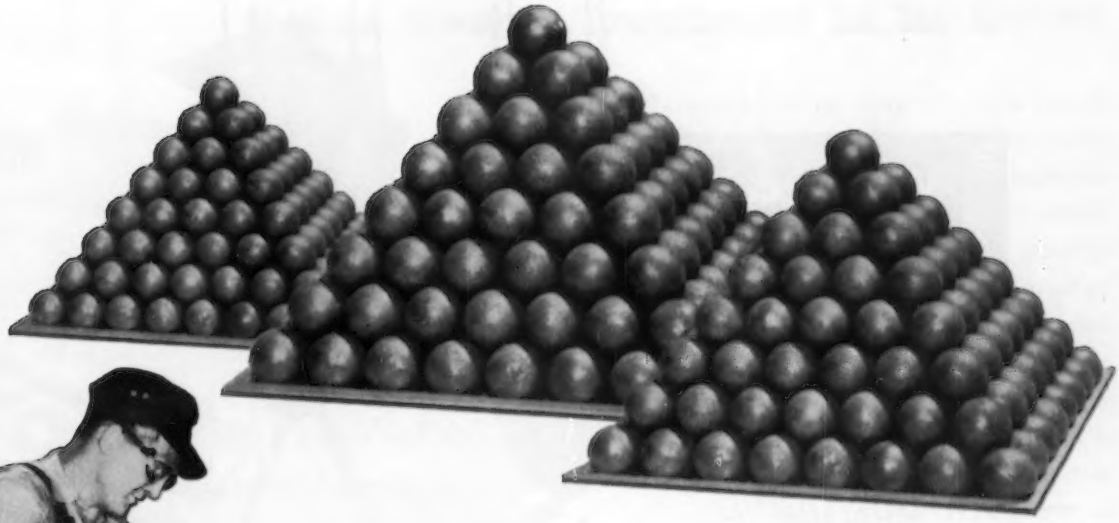

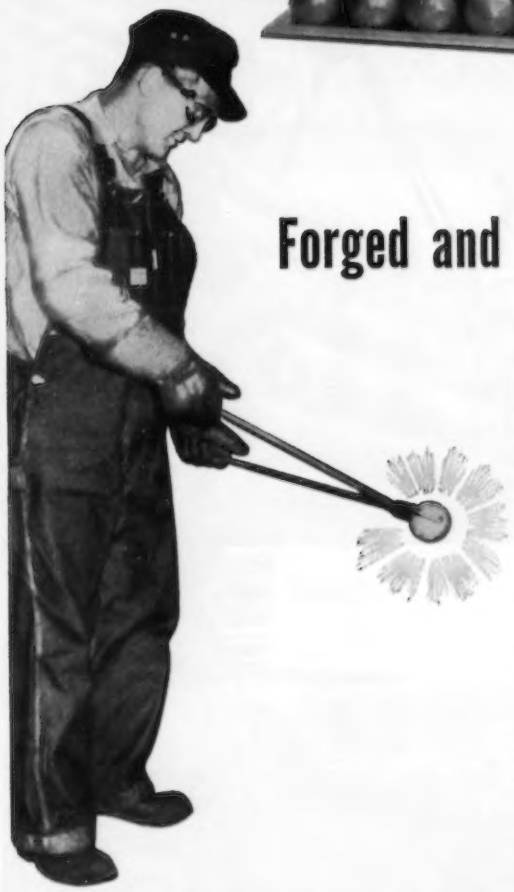

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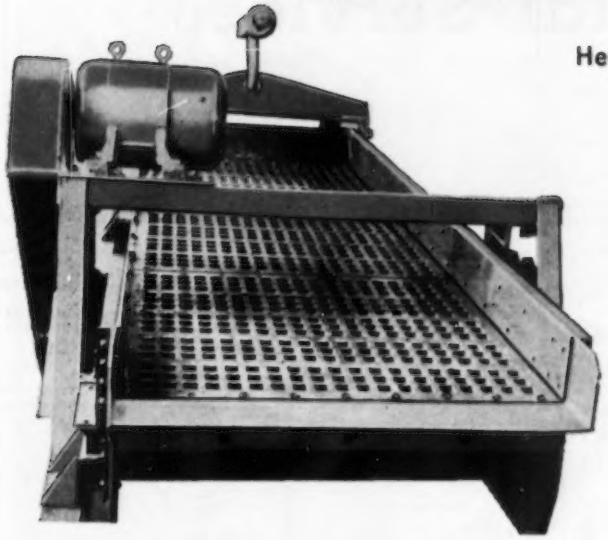

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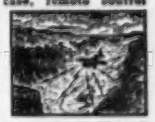

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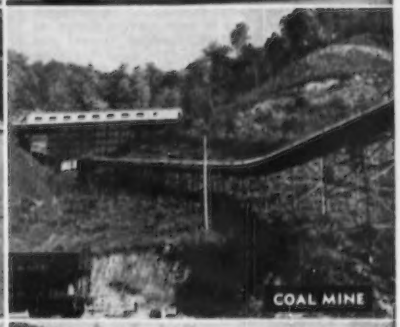
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1—TM-5 Coppus Ventair, 2 HP
10—#2 Buffalo Mine Type, 3 HP
2—Joy Axivane 1-155 230 V DC

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3—36" x 5', 40" between guides
1—30" x 46" floor—35" guides

CARDOX CHARGING PLANTS
1—Koreshell complete plant
1—Cardox complete plant with barrels

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30—18 cu. ft., 18 gauge, RB, Card trucks, new bodies

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1—8' x 26" Duplex Denver Rake
4—6' x 25' Dorr Duplex Rake
1—4½' x 16' Dorr Duplex Rake
1—24" x 11' Akins Spiral

COMPRESSORS
1—I-R 990 CFM, 200 HP motor
2—I-R 284 CFM, 75 HP motors
2—445 CFM, D-13000 Cat Engines, skidded

BELT CONVEYORS
1—48" x 81' centers, steel frame, 10 HP
1—36" x 120' Jeffrey—steel bridge frame and catwalk
1—18" x 56' Pioneer, bridge frame

CRUSHERS
2—2' Symons Std. Cones, 30 HP motors
1—9 x 16 Rogers, late model, jaw
1—9 x 36 Cedar Rapids, jaw

LABORATORY EQUIPMENT
2—9½K McCool Pulverizers
1—9½K DFC Pulverizer
2—Braun Type UA Pulverizers
1—Wilfley Table #13-S, 24" x 50"
9—Analytical and button balances
1—4½" x 10" Davis Jaw Crusher

FLOTATION EQUIPMENT
2—6-cell #15 Denver Sub A
1—5-cell #9-S Fagergren, 36"

DIESEL GENERATOR SETS
1—300 KW, 480 V. G.M. Engine, air starting
1—250 KW, 480 V. G.M. Engine, air starting
2—112½ KVA, 480 V. Cat. D-17,000 engines
2—100 KW, 480 V. Cummins L.I. Engines

HOISTS, MINE SHAFT
1—250 HP 2-drum shaft hoist, Denver
1—200 HP, 1-drum Nordberg, complete
1—150 HP, 1-drum Ottumwa
3—125 HP, 1-drum, herringbone gears

HOISTS, TUGGER AND SLUSHER
3—I-R HNN1J 2-drum air
5—I-R 25 MNN3D, 3-drum electric
2—I-R 20 MN2D, 2-drum electric

BALL AND ROD MILLS
3—5 x 10 Allis Chalmers, Rod
1—5 x 10 Stearns Roger, Rod
2—6' x 22" Hardinge Conical, 50 HP
1—7' x 36" Hardinge, 100 HP
1—7' x 48" Hardinge, 150 HP motor
2—4 x 5 Eimco & C.I.W., 40 HP
1—5 x 6 Allis Chalmers

LOCOMOTIVES
7—Mancha Titan A & B, 18" or 24" gauge, 3½ ton capacity
1—G.E. 2½ ton, Battery, 18-24 gauge
1—Plymouth 10-ton diesel, late model, std. RR gauge

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5—Eimco 12-B, 18-24 ga. Rebuilt
1—GD-9 Gardner Denver, 18" ga. Rebuilt

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2—250 KVA Allis Chalmers, 2400-480 V.
1—750 KVA Pittsburg, 44,000-2300 V.
1—1000 KVA G.E., 44,000-2300 V.

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278 CFM	125 psi	2 stage Chicago PB-50 HP Elec
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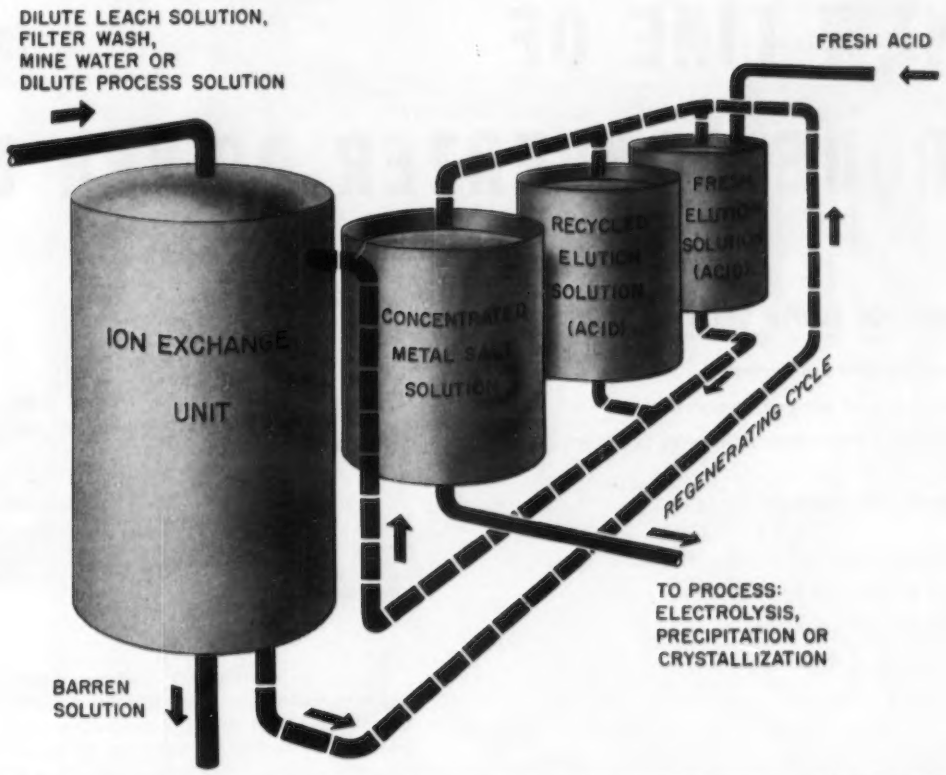
METAL CONCENTRATION BY ION EXCHANGE



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Ion Exchange methods apply to these metals:

Base Metals	Minor Metals	Precious Metals
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Zinc	Tungsten	Silver
Lead	Molybdenum	Platinum
Tin	Vanadium	
Aluminum		Rare Earths
	Decorative Metals	Lanthanide Group
	Nickel	Actinide Group
	Chromium	Uranium

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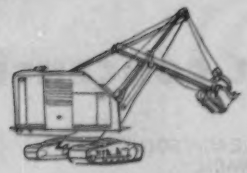

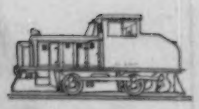

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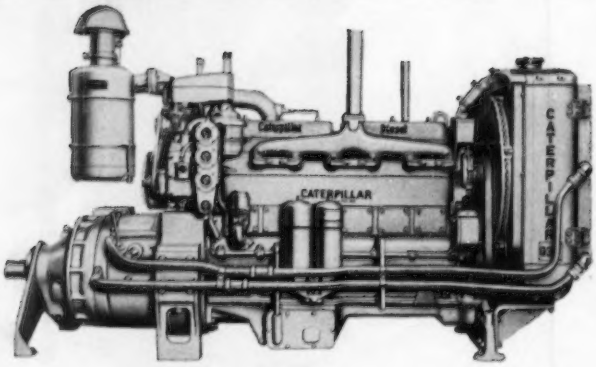
7. Caterpillar can supply your torque converter requirements from stock.
8. Caterpillar Dealers have facilities and parts for servicing torque converters.



Now, to provide you with a greater selection of power packages, Caterpillar offers a new line of torque converter units. As many as twelve different torque converter arrangements are available for *each* of six Cat Engines, up to 430 HP. Whatever your power needs in excavators, hoists and locomotives, you'll find the right unit in Caterpillar's complete line.

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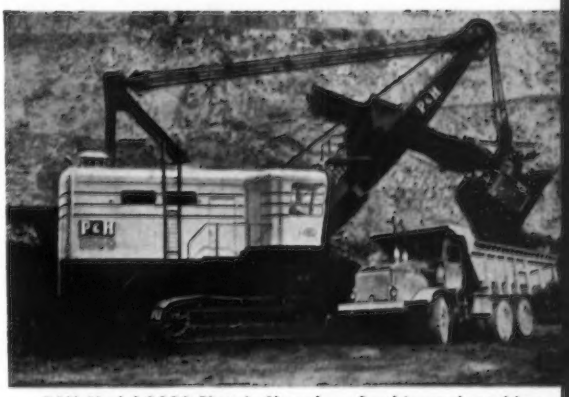

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